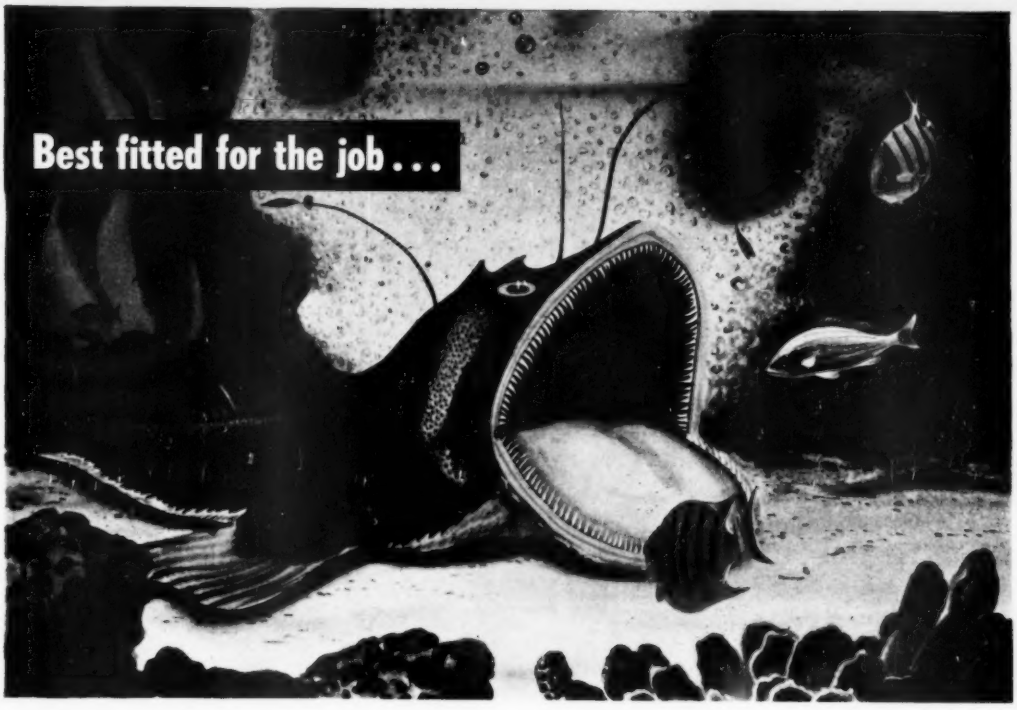
the OIL AND GAS JOURNAL



The **ANGLER FISH's** *body is merely a purse-like attachment to a mouth that is fearful and wonderful to behold. He lies on the bottom where the muddy mottlings of his skin give him the appearance of mud and sand; props his mouth open for the admission of any fish, crustacean, or reptile that chooses to enter.*

PRODUCT IMPROVEMENT and SERVICE are factors by which Hughes Tool Company has attained its position of leadership. Rock bits capable of penetrating any formation yet encountered . . . dependably delivered to the rig . . . plus sound, competent advice on how and when to best use these tools. Thus, Hughes Tool Company provides the drilling industry with constantly improved products and services — best fitted for the job.

HUGHES TOOL COMPANY
HOUSTON, TEXAS
Standard of the Industry

PRICE 50 CENTS TABLE OF CONTENTS PAGE 43 **MARCH 16, 1950**

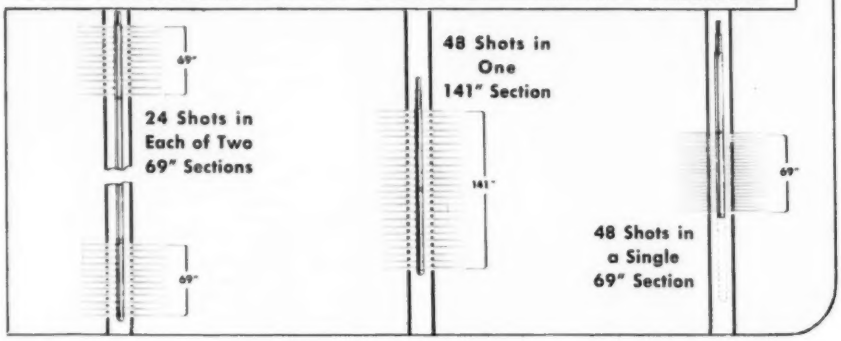
THAT'S
what we've been wanting!

LANE-WELLS F-2 GUN

THE PENETRATION OF

KONESHOT

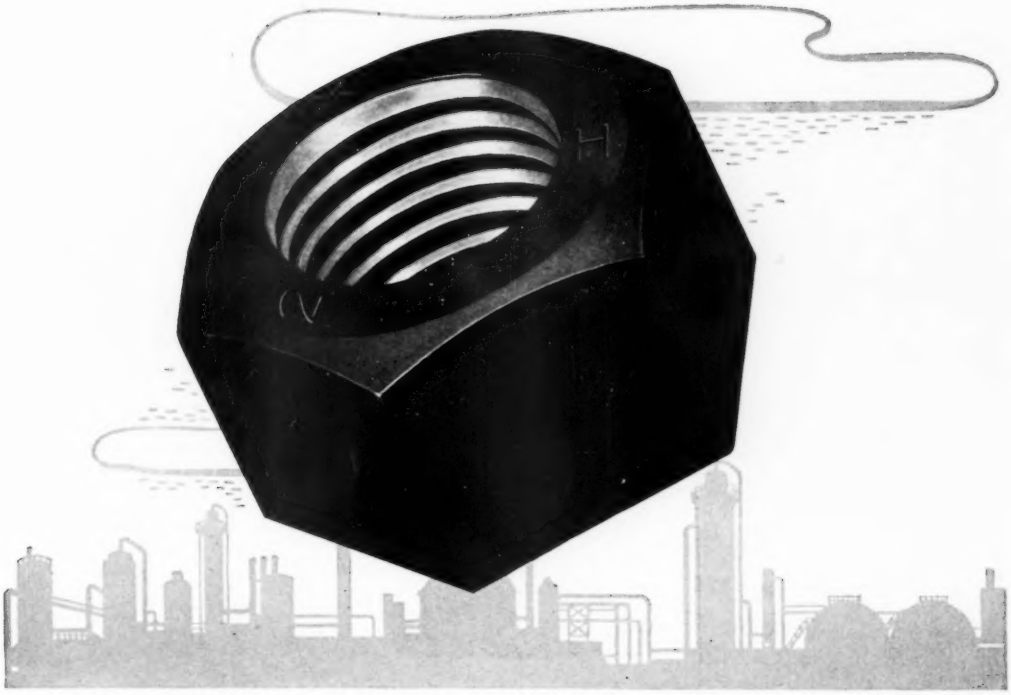
SHAPED CHARGE PERFORATING PLUS
THE FLEXIBILITY OF SEMI-SELECTIVE FIRING



ASK YOUR **LANE WELLS** ***MAN!***

LOS ANGELES • HOUSTON • OKLAHOMA CITY
General Offices, Export Office and Plant • 5610 SO. SOTO STREET, LOS ANGELES 11, CALIFORNIA
LANE-WELLS CANADIAN COMPANY • PETRO-TECH SERVICE CO. IN VENEZUELA

AK-303



GIVES A GOOD ACCOUNT OF ITSELF AT ELEVATED TEMPERATURES

In the high temperature bolting jobs encountered in refineries, you can always count on faithful service from the Bethlehem Quenched Nut.

The Bethlehem Quenched Nut gives a good account of itself in high-temperature, high-pressure applications because of its built-in strength. This is the result of *hot forging*. The nut is not merely punched from a hot bar, but is actually formed by forging and extruding hot metal into a forming die. This method of manufacture, plus liquid quenching and tempering heat treatment, produces a nut strong enough to break any stud or bolt on which it is used.

The Quenched Nut has a highly refined, tough grain structure, and oxidized sides which are resistant to corrosion. Its ground bearing surface is definitely superior to common, machined surfaces.

The Quenched Nut is produced at Bethlehem's Lebanon, Pa., plant, and is carried in stock in bolt sizes from 3/8 in. to 3 1/2 in. It conforms in every respect to Grade 2H of ASTM Specification A194. Lebanon Plant also stocks nuts in Grades 0, 1, 2 and 4. For complete details about nuts for high-temperature bolting, contact the nearest Bethlehem sales office, or write to us at Bethlehem, Pa.

BETHLEHEM QUENCHED NUT

Grade 2H

Chemical Composition

Carbon	0.40 min
Phosphorus	0.05
Sulphur	0.05

Hardness Requirements

Brinell	248 to 352
Rockwell C	24 to 37

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Bethlehem supplies every type of Fastening

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1950

IT'S EASY TO CARRY — weighs only 44 pounds. The case is only 19¾" long, 10⅝" high, and 9¼" deep.

IT CAN BE SET UP ANY PLACE where there's a 115-volt, a-c supply—forestry, utilities, construction projects, etc.

IT'S IDEAL for 2-way operation (police, fire, etc.) in small and medium-size municipalities requiring medium-range communication equipment.

For *portable or fixed* station use

. . . the RCA Carfone Station Unit "15"

THIS is the most versatile 2-way radio station ever designed for medium-range communication. It is complete with transmitter, receiver, power supply, portable antenna, handy microphone, and loud speaker—*all in a single package.*

Easy to carry and easy to set up, this portable unit can be operated wherever there is a 115-volt, a-c outlet.

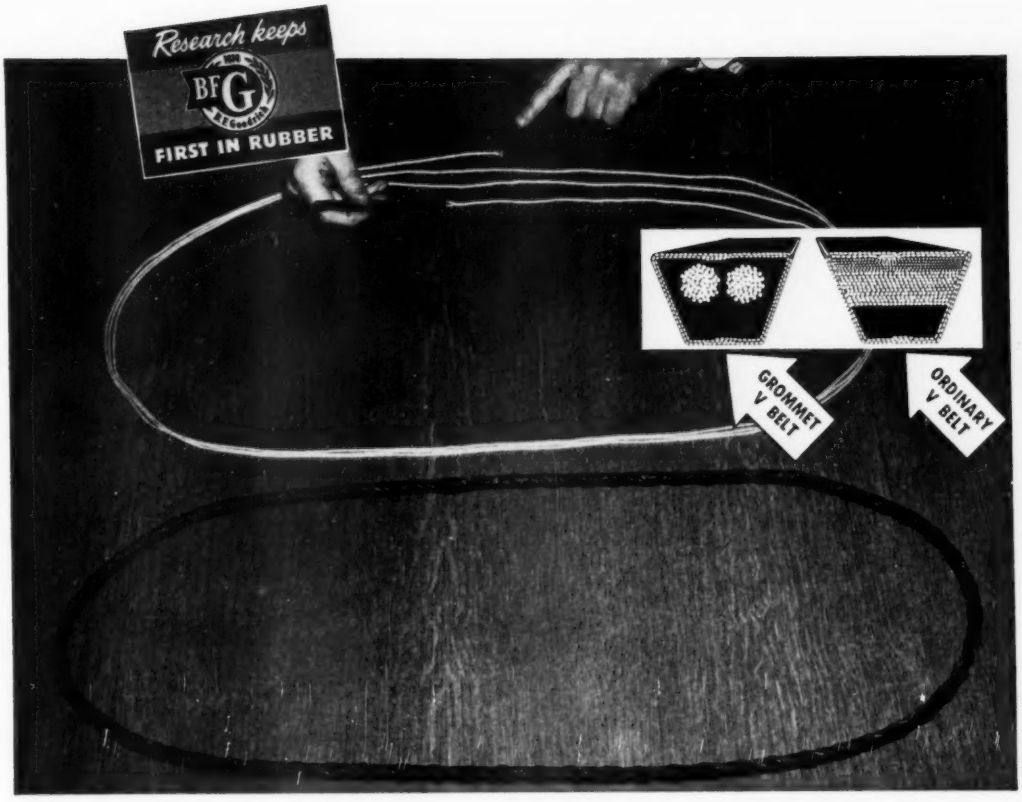
For fixed station use, place the unit on the operating desk, hook-up the antenna, plug in the power cord, and you're set to go. For portable station use, simply connect the quarter-wave, whip antenna (supplied) and plug in the power cord. No extra components to carry around. No installation expense involved.

Greatly improved receiver selectivity reduces adjacent channel signals well below interference levels. A newly-designed transmitter modulation control enables you to transmit the full signal potential of the transmitter and maintain 100 per cent modulation at virtually all voice levels — *whether you shout or whisper into the microphone.*

For complete information on the new RCA Carfone Station Unit "15", write Dept. 122C. RCA Engineering Products, Camden, New Jersey.

MOBILE COMMUNICATIONS SECTION
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal



How to eliminate most of your V belt cord failures

B. F. Goodrich grommet V belts last 20 to 50% longer, cost no more

IF YOU are now using ordinary V belts, most of your cord failures occur in the overlap section, where cord ends are joined. B. F. Goodrich grommet V belts use *endless* cord grommets, thus do away with the overlap section, eliminate the cord failures that normally occur there. That's one reason why BFG grommet belts last 20 to 50% longer, though they cost *not one cent more!* Here's the whole grommet story —

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends (as in an ordinary V-belt cord section), no stiff, weakened section of "spliced" cord. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. This eliminates "dishing" of cords in the center of the belt, insures full use of all cord strength, maximum power delivery, even load distribution. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, free of stiff overlap, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet! — Twin grommet construction is an exclusive, patented B. F. Goodrich feature — no other V belt is a grommet V belt, (U. S. Patent No. 2,233,294) To get genuine grommet V belts (at present made in D and E sections only) see your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY
B.F.Goodrich

Always first

Conceived FIRST, *developed* FIRST, *produced* FIRST. **This is the undeniable record of AEROQUIP DETACHABLE, REUSABLE HOSE FITTINGS. Industry was quick to accept this new and original "Aeroquip Idea." Not only did industry adopt the "Aeroquip Idea," other manufacturers jumped headlong into the manufacture of products they hoped to substitute for Aeroquip Fittings. Imitation is the best form of flattery, but Aeroquip design and quality have never been equalled.**

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JACKSON, MICHIGAN

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AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U. S. A. AND ABROAD

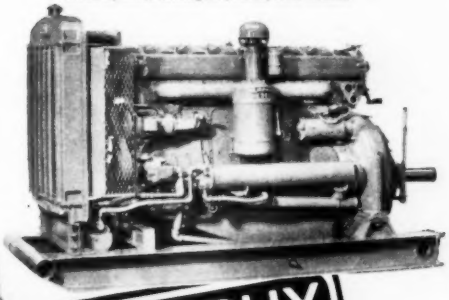
Drill more wells, faster

with MURPHY DIESEL POWER

DEPENDABLE heavy duty Murphy Diesel Power is the kind of power that stays on the job longer with less downtime, to give you more horsepower hours of drilling every tour. "True" diesel operation, unit fuel injection, four valves per cylinder and extra heavy crankshafts and bearings are just a few of the many reasons why Murphy Diesels are able to deliver this kind of power. The booklet *"10 Questions to Ask a Diesel Engine Salesman"* gives more of the details. Ask your Murphy Diesel Dealer for a copy or write direct.

MURPHY DIESEL COMPANY
5305 West Burnham St., Milwaukee 14, Wisconsin

Illustrated is a Unit 15 rig powered by three 150 H.P. Murphy Diesels which also supply power for the mud pump. The rig is in use at Lindrith, New Mexico, drilling gas wells. This is one of two Murphy powered rigs owned by Aztec Drilling Co., Aztec, New Mexico.



MURPHY DIESEL

See Your Murphy Diesel Dealer

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OIL INDUSTRY FACTORY BRANCH — *Sales, Parts and Service:*
113-117 South Elwood Street, Tulsa, Oklahoma

Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 220 H.P. Generator Sets 60 to 133 K.W.

50,000 Miles - No Wear!

1. Proved by Punishing Road Test! For 70 days, six brand-new cars roared along the Mexican border . . . putting new Conoco Super Motor Oil to one of the cruelest tests ever devised. After 50,000 miles of continuous driving, engines *showed no wear of any consequence* . . . in fact, an average of less than one one-thousandth of an inch on cylinders and crankshafts.

2. New-Car Mileage! Gasoline mileage for the *last* 5,000 miles of the run was as good as for the *first* 5,000 . . . actually there was an average difference for the fleet of only 4/100 of a mile per gallon. Proving that Conoco Super Motor Oil—with proper crankcase drains and regular care—can keep your new car *new*.

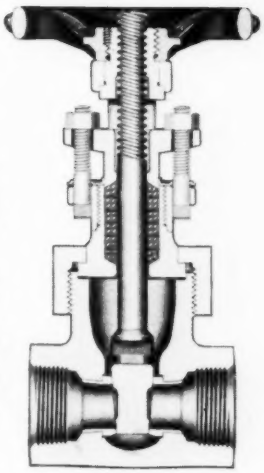
3. New-Car Power! Quicker Starts! Yes—Conoco Super Motor Oil's *extra protection* keeps that factory flash . . . that showroom smoothness . . . year after year! Conoco Super Motor Oil OIL-PLATES metal surfaces to make your engine last longer, perform better, use less gasoline and oil! Conoco Super Motor Oil virtually *stops wear before it starts* . . . keeps your engine *new* and *clean*.

NEW CONOCO Super MOTOR OIL

© 1950, CONTINENTAL OIL COMPANY

All the piping equipment you need

...on one order to CRANE



No. 3602X or XW
Sizes: ¼ to 2-inch
Screwed or welding ends

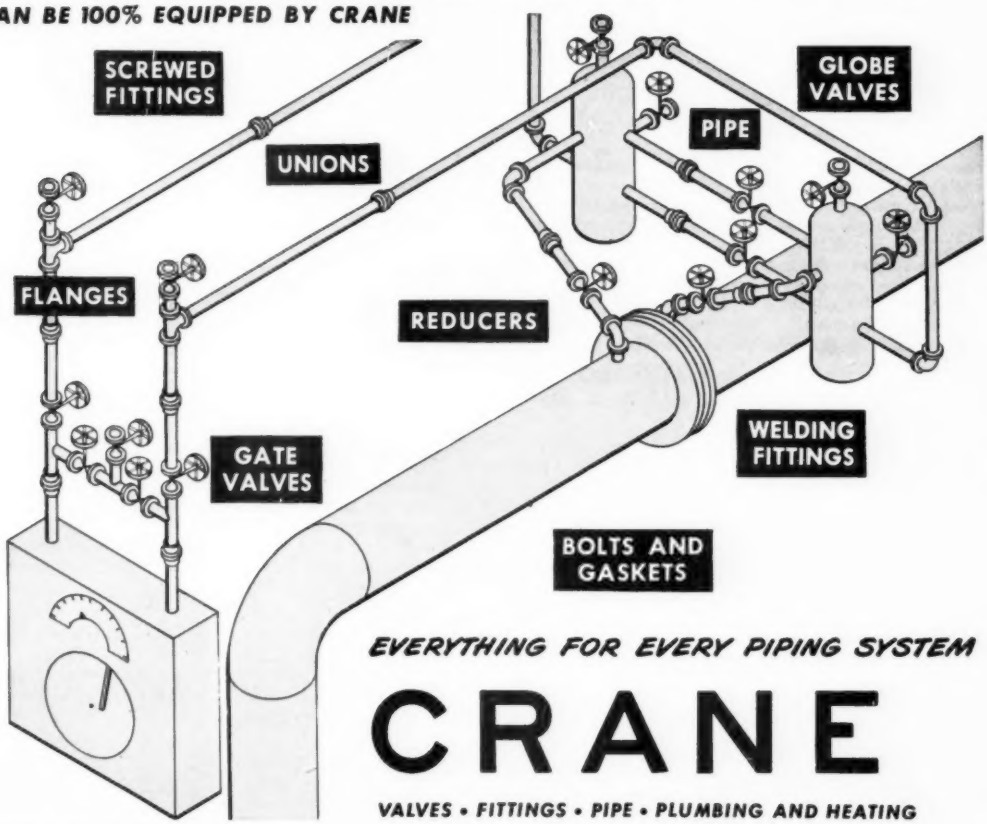
SMALL STEEL VALVES WITH BIG VALVE FEATURES

Crane 600-Pound Small Steel Gates with Union Bonnet—for oil and oil vapor services—are smaller, lighter, and more compact than usual high pressure design. High quality carbon steel body, bonnet, and yoke provide extra strength and safety under rough usage and extreme pressure-temperature conditions.

Seating can be either Crane Exelloy to Exelloy, or Crane Hardened Stainless Steel to Exelloy. Seat rings of heavy section, securely rolled into body, prevent leakage around the ring . . . will not loosen in service. Husky bonnet ring, with long, precision cut threads, pulls up easily—always stays tight. Blowout-proof, soft iron gasket in bonnet joint is unaffected by highest temperatures or fluids on recommended services. For more information, see your Crane No. 49 Catalog or write for Circular AD-1741.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

THIS METER PIPING INSTALLATION, FOR EXAMPLE, CAN BE 100% EQUIPPED BY CRANE

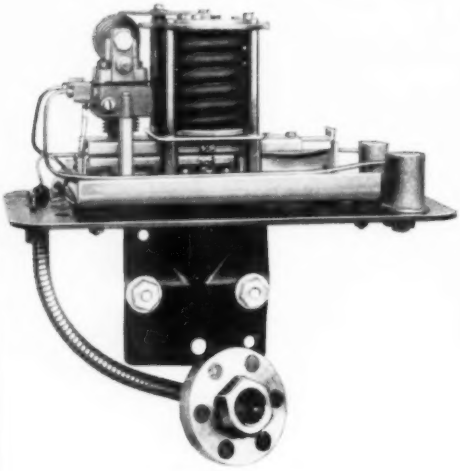


EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

Changing temperatures or pressures instantly and accurately measured by Taylor TRANSAIRE* Transmitters



PRESSURE:

New Taylor TRANSAIRE Pressure Transmitter with narrow range spans lets you measure and transmit minute pressure changes up to 1000 feet. Works on simple force-balance principle. Accurate to $\frac{1}{2}\%$ of the selected short range span (*conventional devices are only accurate up to* $\frac{1}{2}\%$ *of upper range limit*). Sensitive to pressure changes of $\frac{1}{2}$" water. Here's accuracy and sensitivity never before possible in pressure measurement—plus the convenience of suppressed ranges at high pressure levels.

SEVEN IMPORTANT ADVANTAGES:

1. Range spans of 20 and 10 psi available throughout range limits of 35 to 415 psia.

2. Volumetric type pressure system is extremely accurate, practically clog-proof, has corrosion-resistant 316 stainless steel diaphragm.

3. Temperature and barometric compensation for higher accuracy of measurement and control.

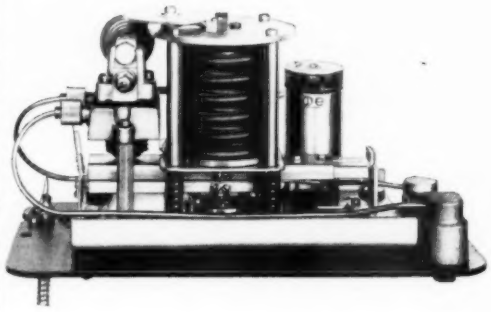
4. Perfect for many jobs, especially thin fractionating columns.

5. No individual calibration of receivers or controller—thanks to standardized 3 to 15 psi output air pressure.

6. Simple screwdriver adjustment for shifting the operating ranges.

7. Interchangeable manifold assemblies make 20 and 10 psi range spans optional.

*Trade Mark



TEMPERATURE:

New Taylor TRANSAIRE Temperature Transmitter with Speed-Act* lets you measure and transmit smallest temperature changes up to 1000 feet with instant accuracy! The *only* temperature transmitter that gives you:

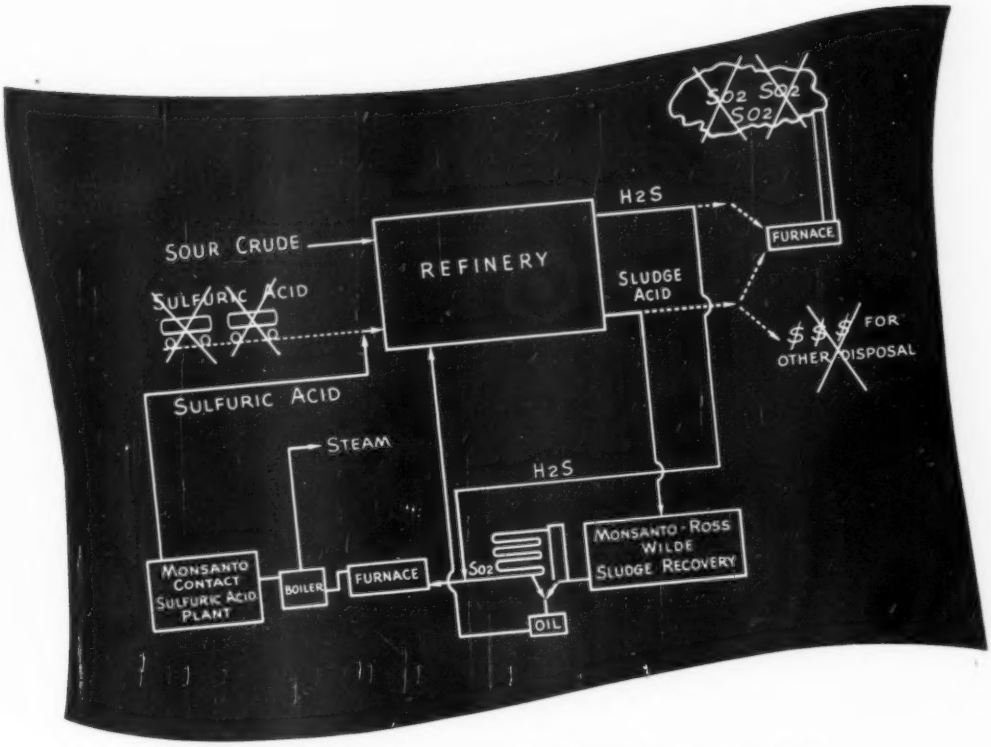
1. DYNAMIC ACCURACY—which means the accuracy of an instrument in measuring changing or dynamic conditions. Transaire Dynamic Accuracy is unparalleled. Solves the problem of process engineers who realize that an instrument accurate to a fraction of a degree in measuring static conditions can be in error by many degrees when temperature is changing.

2. DYNAMIC COMPENSATION—which means ability to compensate for inherent lags both in measuring system and rate of heat transfer of process medium. Transaire does this by introducing derivative action (Speed-Act) into the *measuring* circuit. The result is Dynamic Accuracy, with a speed of response seldom thought possible which permits much closer automatic temperature control.

▼ ▼ ▼

For complete details, write for **Bulletin 98140** on TRANSAIRE Temperature Transmitter, and **Bulletin 98099** for TRANSAIRE Pressure Transmitter. Ask your Taylor Field Engineer! Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST



How to change sludge acid into dollars

Monsanto now brings you a thoroughly-proved process for recovering oil and new, clean, high-grade sulfuric acid from sludge acid . . . and if you have H_2S, you can use it too. Thus, refinery wastes are *changed into dollars* . . . dollars added to the *profit end* of income.

The Monsanto process *saves dollars* now spent to dispose of sludge acid and H_2S . . . an important economy for many refineries. And it gives you a *plus value* in better community relations by eliminating pollution of the air and streams.

The process *earns dollars* by recovering oil which can be refined into salable products . . . by producing sulfuric acid needed for your refinery processes . . . by generating steam that can be employed in your operations.

Pull out the figures and see how much it's costing you to dispose of H_2S and sludge acid. Then, call in a Monsanto representative and see how economically you can install the Monsanto process to change these wastes into valuable products. You can get complete details, without cost or obligation, by mailing the coupon or contacting MONSANTO CHEMICAL COMPANY, Engineering Sales Department, 1745 South Second Street, St. Louis 4, Missouri.

MONSANTO
CHEMICALS PLASTICS

MONSANTO CHEMICAL COMPANY
Engineering Sales Department
1745-L South Second Street, St. Louis 4, Missouri

Without cost or obligation to my company, please send your representative to discuss ways of changing sludge acid and H_2S into dollars.

Name _____ Title _____

Company _____

Street _____

City _____ Zone ___ State _____

SERVING INDUSTRY . . . WHICH SERVES MANKIND

"...here are MY warehouses... in KANSAS!"

As disclosed by the map, Jones & Laughlin Supply store locations fit the Kansas oil country like a glove.

Moreover, that glove is well lined. Store stocks are adequate and well adapted. They fit the needs and customs of the area.

This combination of convenient store locations and dependable supplies has enabled many an oil man to do a better job in Kansas.

And it's that way in fields from the continental divide to the Atlantic coast. Wherever there is oil, you'll find a Jones & Laughlin Supply store nearby with whatever you need to do the job.

We'd like to have YOU say ". . . here's MY warehouse!"

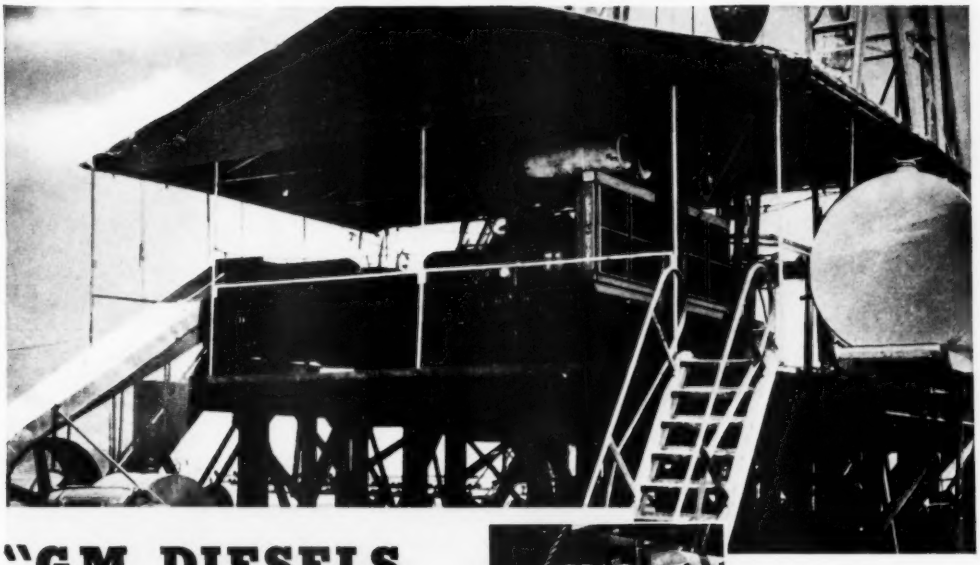
J&L STEEL

JONES & LAUGHLIN SUPPLY COMPANY

Subsidiary of Jones & Laughlin Steel Corporation

Tulsa, Oklahoma

EXPORT: 230 Park Ave., New York 17, N.Y., U.S.A.



"GM DIESELS *give us faster round trips"*

says James G. Cullum of Wichita Falls, Texas

Wilson Giant rig, operated by Cullum Brothers Drilling Co., is powered by two GM Series 71 Diesel Twin sizes delivering 276 continuous H.P. per twin at 1000 RPM shaft speed. Table speed up to 180 RPM. Gardner-Denver 7¾ x 16 mud pump, V-belt driven from chain compound, delivers 650 to 700 lbs. pressure with 7¼" liners, 63 strokes per minute.

THE sizzling pace young Jim and Landon Cullum are setting for speedy completions in the North Texas fields has won them the reputation of "fastest drillers in the area."

Records like this tell the story: 70,000 feet of hole drilled in the first 8 months—4,000 feet in 4 days and 9 hours, using 13 bits—and, on a speed test, 1,450 feet with one bit in 9 hours. What do you find powering Cullum Brothers' rig? General Motors Series 71 Diesel engines.

These modern 2-cycle Diesels are compact as well as powerful. They're lower in weight as well as husky. They pick up under load fast and they stay on the job.

Oil men everywhere are finding that GM "71" Diesels make drilling faster, easier and much more profitable. It's sure worth looking into. Let us see that you get the full details.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... *Up to 200 H.P.* **DETROIT 28, MICHIGAN** MULTIPLE UNITS... *Up to 800 H.P.*

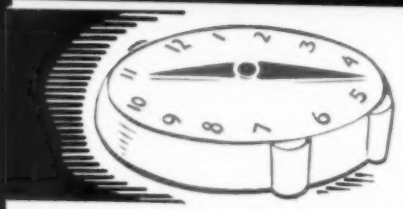
GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

GENERAL MOTORS CORP., DIESEL ENGINE SALES, PETROLEUM INDUSTRY, 1504 Philtower Bldg., TULSA 3, OKLAHOMA

CALIFORNIA: Anderson-O'Brien Co., LOS ANGELES 21; Lawless Brothers, BAKERSFIELD; West Coast Engine & Equipt. Co., BERKELEY. **ILLINOIS:** Western Machinery & Engine Co., CENTRALIA. **KANSAS:** Diesel Equipment Co., Inc., WICHITA. **COLORADO:** Colorado Builders' Supply Co. (Equipt. Division), DENVER. **LOUISIANA:** George Engine Co., Inc., HARVEY; United Tool & Valve Repair Co., SHREVEPORT. **MISSOURI:** Western Machinery & Engine Co., ST. LOUIS 10. **MONTANA:** Seitz Machinery Co., Inc., BILLINGS; Mountain Tractor Co., MISSOULA. **OKLAHOMA:** Diesel Power Co., OKLAHOMA CITY. **TEXAS:** Stewart & Stevenson Services, Inc., HOUSTON 1, McALLEN, DALLAS, CORPUS CHRISTI, WICHITA FALLS; Haynes Machinery Co., PLAINVIEW; Empire Machinery Co., Ltd., ODESSA. **WYOMING:** Colorado Builders' Supply Co. (Equipt. Division), CASPER.



'ROUND THE 'ROUND

Lee Kelton
Rocky Mountains

Ed Nelson
Kansas

Ralph Stevens
Gulf Coast

Hal Fessler
Ark-La-Tex

Verne Palmer
Central States

Floyd Myers
West Texas

Joe Conrin
California

Buddy Arras
Arras Tank Co.

Dee Unsell
Denver

Ed Reif
Casper

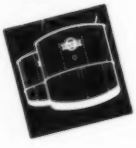
Joe Revill
New Castle

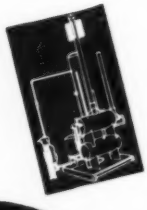
Red Doores
Craig

James Connor
Powell

Ed Byers
Tulsa

Sam Driver
Drumright





Emery Allee
Elk City

Dave Bland
Graham

Bob Sivalls
Fort Worth

Bill Watkins
Snyder

John Williams
Nocona

Ed Pool
Odessa

Buck Jones
Alice

Clint Ross
Lubbock

Glenn Parmlee
Houston

John Cross, Jr.
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Ray Downing
Kilgore

Marion Miller
Wichita

Eugene Cottrell
Hays

Joe Beggs
Ellinwood

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Calgary, Canada

Gen. Harlan Mumma
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Provides THAT "SWITCH IN TIME"

S&J

This S.&J. Level Alarm, Figure ST-4440, will automatically signal the rise or fall of fluid level past a predetermined point in a high pressure tank, tower or other vessel. It can be used to ring a bell, sound a horn or howler or flash a light that will warn operating personnel to correct unsafe or undesired conditions BEFORE they become critical. It can also be used to close or open electrical circuits, ground magnetos or close relays. There is an almost unlimited potential for the use of the S.&J. Level Alarm to actuate electrical instruments or controlling devices connected with high pressure processing, transfer and storage of petroleum products.

The body of this Level Alarm is of cast steel and is designed for working pressures up to 500 pounds. The vapor-proof switch box is equipped with a gasketed glass window for visual inspection of the interior mechanism. It employs no stuffing box whatsoever, but utilizes six pole magnets to actuate the mercury switch. The alarm is regularly supplied with one mercury switch, but additional switches can be mounted on the mounting plate, or special switches can be supplied on order at an extra charge. It is available in the fully automatic type only, and can be supplied with Underwriters' Listed Explosion-proof Switch Box. It is then designated as Figure ST-4440 UL.

SHAND & JURS CO.
BERKELEY, CALIFORNIA

NEW YORK CHICAGO HOUSTON LOS ANGELES SEATTLE

SHAND & JURS

ONE SOURCE

For Every Oil Field Requirement

★ DRILLING
★ PRODUCING
★ REFINING
★ PIPELINE

Each Bovaird store is well stocked with nationally known brands of supplies for drilling, producing, pipeline and refining operations.

Bovaird stores are strategically located throughout the oil states of Illinois, Kansas, Oklahoma and Texas. Each one is ready to serve you efficiently and courteously.

SUPPLY BOVAIRD COMPANY

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ILLINOIS—Clay City, Grayville, Salem
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"Buy From Bovaird"

THE Bovaird SUPPLY CO.
GENERAL OFFICES
TULSA, OKLAHOMA

in Mechanical Drive Turbines

TYPE DP

For flexible speed control, performance accuracy, and on-the-job reliability, you can't beat a General Electric standard DP turbine with its totally-enclosed hydraulic governing system.

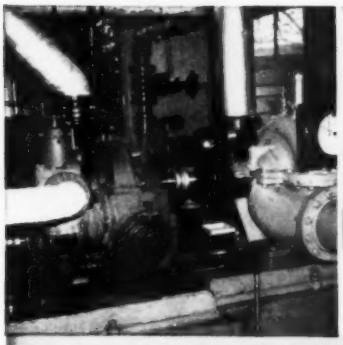
This pressure-relayed system gives you ease and accuracy of control that compares with the precision speed governing of large central station turbines. Yet the DP is a standard design, sold at standard prices.

YOU GET A WIDE SPEED RANGE—30% adjustment for flexibility of operation. This feature, combined with the wide variety of ratings and speeds available, provides you with the "right" turbine for any job.

YOU GET PERFORMANCE ACCURACY—6% regulation means holding the speed you want on important processes. Regulator control is available for governing in terms of any process requirement.

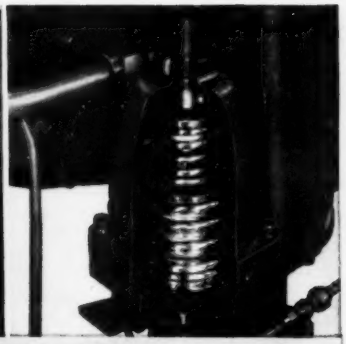
YOU GET GREATER RELIABILITY—the hydraulic governing system keeps moving parts to a minimum, operates in an oil atmosphere with no exposed linkages. This eliminates wear and corrosion, assures dependable operation.

Check the features of the standard DP. It can give you the kind of precision performance you're looking for, the savings in operating costs that boost profits. Contact your nearest G-E sales office for complete details. Apparatus Dept., General Electric Company, Schenectady 5, N. Y.



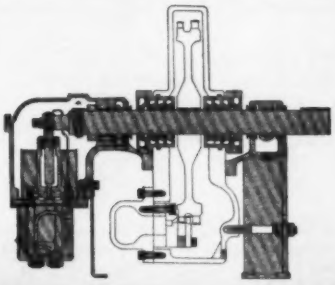
In this plant, a General Electric 30-hp DP turbine is coupled to a centrifugal pump. The hydraulic governing system provides accurate, reliable performance over a wide range of speed adjustment.

This turbine-type oil pump, gear driven from the main shaft, signals any tendency for the DP to speed up or slow down with changes in load. The pump also provides oil pressure for positioning the governor valve.



Acting on the speed signal from the oil pump, this pressure relay controls the amount of oil pressure in the operating cylinder. This cylinder regulates the amount of steam admitted to the turbine through the governing valve.

HYDRAULIC GOVERNING makes a difference



Here's What Standardization Provides For You

In the diagram at the left, all shaded parts are interchangeable on all sizes of DP turbines. Thus, it is easy to stock spares, and maintenance costs are reduced. All models have standard shaft height and coupling fits for easy installation or re-location in your plant. Standardization cuts manufacturing expense and the savings are passed on to you in the form of extra features usually found only on "special" turbines.

GENERAL ELECTRIC

252-44

This Cameron NON-LUBRICATED LIFT-PLUG VALVE

opened and closed daily for 255 days against

5000 LBS. PRESSURE-

STILL OPERATES AND SEALS PERFECTLY!

This high pressure gas-distillate well in the Chocolate Bayou Field, Brazoria County, Texas, provides an interesteing case in which the new Cameron Non-Lubricated Lift-Plug Valve demonstrated its sound design under extreme conditions. As a means of protecting the tubing and Christmas tree manifold against the corrosive distillate production, the operator resorted to the use of a solid corrosion inhibitor which was inserted daily thru a lubricator on top of the tree. This required the opening and closing of a valve. A conventional gate valve was installed on the tree for this purpose, but due to the difficulty of operating such a valve under high pressures and effecting a pressure-tight seal, the operator replaced the conventional gate valve with a Cameron "LP" Valve and solved both problems.

The remarkable ease of operation of the Cameron "LP" Valve, and its leak-proof seal against 5000 lbs. gas-distillate pressure plus the fact that the valve has required no maintenance, provides positive proof of the revolutionary, though sound, design.

Complete details will gladly be sent to interested operators on request.

THE BEST FEATURES OF PLUG AND GATE VALVES COMBINED WITH NEW CAMERON INNOVATIONS

- NON-LUBRICATED—no grease of any kind required to effect a seal; also reduces chance for human error and need for maintenance.
- PRESSURE SEALING—when plug is seated, line pressure automatically forces seat into tighter engagement with plug.
- UNIQUE LIFT-PLUG ACTUATOR—a novel mechanical design which lifts, turns and reseats plug in continuous turn of a lever.
- RENEWABLE SEAT AND PLUG—easily replaced; permits any desired trim.
- FIELD REPAIR—can be completely overhauled without removal from line; no special tools or skill required.
- EASY OPERATION—requires less operating effort than other valve designs.
- FORGED STEEL—All parts, including body, are press or drop forged from specification materials.

Cameron

IRON WORKS, INC.

P. O. BOX 1212 HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y.

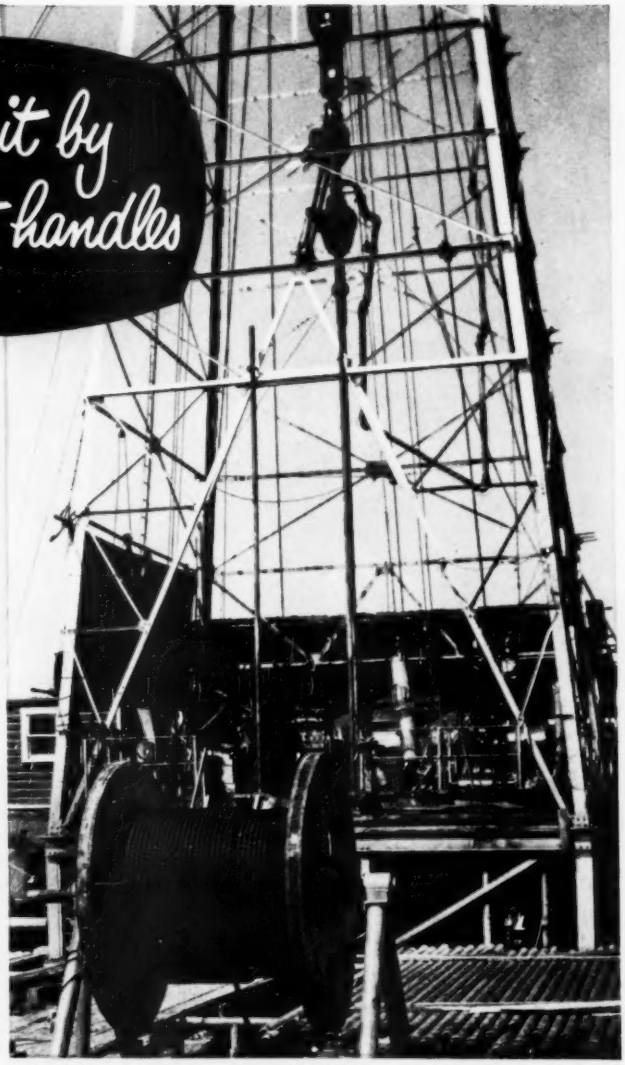
Judge it by the jobs it handles

TIGER BRAND WIRE ROPE

SOME of the world's deepest wells have been drilled with TIGER BRAND Wire Lines . . . and some of the fastest drilling records have been set with rigs strung with TIGER BRAND. These outstanding jobs prove the outstanding performance of TIGER BRAND Rotary Lines.

But there's one record that may be of more interest to you than any of these—and that's the day-by-day record of "low cost per ton mile" on your own rig. We have seen enough performance records to know that TIGER BRAND Lines, when properly handled, will give you the most service for dollar of cost.

There's a reason for this. Through constant research on the strength of various steels, wearing qualities, flexibility, construction and lubrication, our engineers have determined the best combination of properties for any particular job. When you use TIGER BRAND Wire Lines, you automatically get the benefit of this research and experience.



TIGER BRAND 1¼" ROTARY DRILLING LINE on a well near Cordell, Oklahoma. This contractor keeps an accurate record of wire rope life and uses a high percentage of Tiger Brand.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMERICAN TIGER BRAND WIRE LINES

USS *Excellay Preformed*

USS AMERICAN TIGER BRAND WIRE ROPE UNITED STATES STEEL

SEND FOR FREE BOOKLET

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Cleveland 13, Ohio

Gentlemen:

Please send me a copy of your booklet, "U·S·S American TIGER BRAND Wire Lines For Oil, Gas and Water Wells."

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Company.....

Position.....

Address.....

UNITED STATES STEEL

CUMMINS
Dependable
DIESEL

SINCE 1918...PIONEER OF PROFITABLE POWER
THROUGH HIGH SPEED DIESELS

Here's what you get with Cummins Diesels

Here are four more honest-to-goodness examples of how owners have saved money—and made money—with Cummins Diesel Engines

Service **One of the more than 200 Cummins Dealers is as close as your phone.**

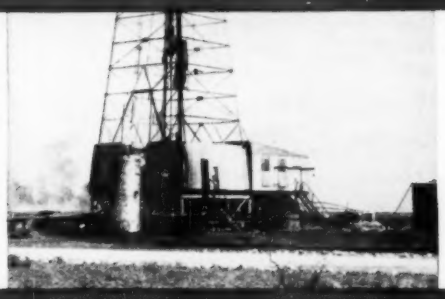
Highspeed Diesel Engines (50-550 hp) for:

On-highway trucks • off-highway trucks • buses • tractors • earth-movers • shovels • cranes • industrial locomotives • air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units • work boats and pleasure craft.

CUMMINS ENGINE COMPANY

LESS FUEL

A shallow well drilling rig powered with two highspeed Cummins Diesels went to 2,600 feet on its first well at a *fuel cost of only nine cents per foot drilled,* including fuel used in swabbing down and heating. This portable drilling rig on the Yingling Oil and Mining Company operation near Keensburg, Ill., includes a Model N4 Brewster drawworks powered with an NHIS-600 Cummins Diesel, and an Emsco slush pump powered with an NHPS-600 Cummins Diesel.

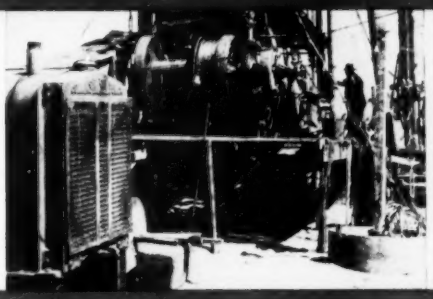


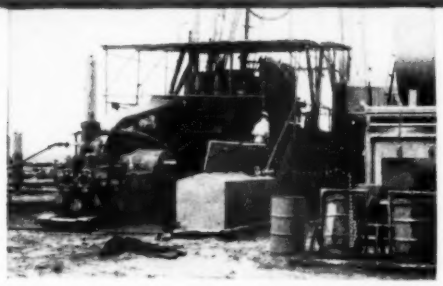
LESS MAINTENANCE

A year and a half of heavy-duty operation with *no time lost due to engine shutdown*—that's the performance report on three Model LI-600 Cummins Diesels powering a drilling rig operated by Davidson Drilling Company near Odessa, Tex. Used in deep-hole work, the Cummins-Powered Wilson Titan rig is drilling wells as deep as 9,700 feet.

LONGER LIFE

A Model HIP-601 Cummins Diesel powering a Fort Worth spudder operated by W. W. Allman of Crane, Tex., has more than *nine years* of dependable, low cost operation. The Cummins-Powered spudder averaged 90 feet of well in 24 hours . . . *saved the operator $200 on a 3,100 foot well* as compared to the cost of electrical power.





MORE WORK

Twelve wells completed to depths ranging from 4,525 to 5,700 feet *in 16 months* of operation—that's the job performance report of two Model LI-600 Cummins Diesels powering a U-15 Unit drilling rig used by Advance Drilling Company near Sundown, Tex. The Cummins Diesels powering this rig *worked three years without an overhaul.*

These typical examples of the profit-making power furnished by Cummins *Dependable* Diesels explain why men who pay the most attention to cost sheets and profit and loss statements choose Cummins Power. Write for further proof that Cummins Diesels can save and make *more* money for you.

Cost Conscious? **CHOOSE CUMMINS DIESELS**

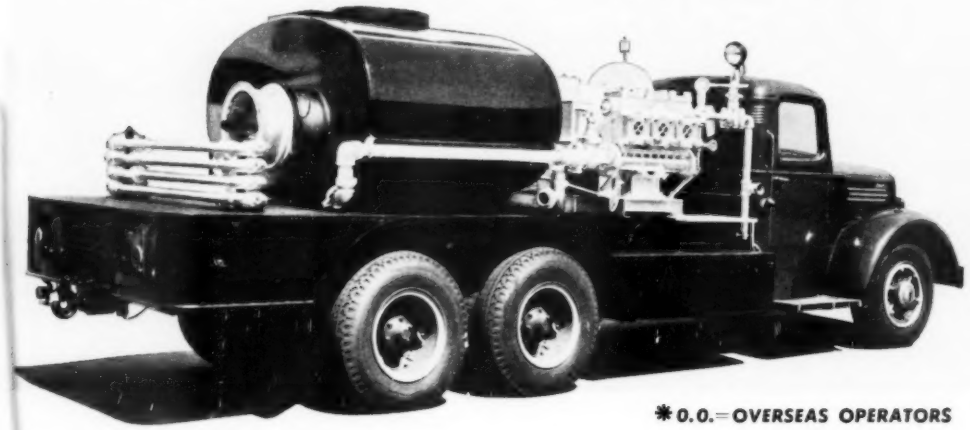
INC. • COLUMBUS, INDIANA

EXPORT: CUMMINS DIESEL EXPORT CORPORATION • COLUMBUS, INDIANA, U.S.A. • CABLE: CUMDIEX

makes acidizing easy for OO*

ICI General Service Pumping Unit handles acid, chemicals, hot and cold oils, and drilling fluids easily and economically

Overseas operators now can speed up and simplify a wide variety of pumping jobs with ICI's General Service Pumping Unit. Originally built for service work in the U.S., this tried and proven unit is now offered for export sale. Write today for prices on this versatile time and money saver.



*O.O.=OVERSEAS OPERATORS

NOTE THESE FEATURES

PUMP: Triplex plunger type pump. Design provides for easy removal of plungers. Bleeder line is attached for releasing discharge pressures. Throttle, clutch, and pressure gauge, located on deck of truck, provide for convenient operation from this point.

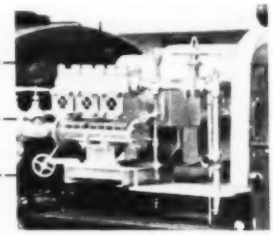
Suction manifolding is flexible. In addition to the line going to the tank, there are two other suction lines. These suction lines can be attached to the pump from barrels, tanks, etc., without disconnecting from the well. Discharge line is equipped with special type valve designed for easy opening and closing under pressure.

TANK: Capacity 1000 gallon or 1500 gallon as desired. The specially designed, rapidly opened and closed manhole provides convenient access to inside of tank or for the easy entry of additive materials to the tank.

POWER UNIT: Choice of truck is optional. May be gas or diesel as required. Pump operates on power take-off from truck engine.

OTHER FEATURES: Provisions are made for storage of all auxiliary fittings. Large tool boxes are built in chassis. Auxiliary steel discharge hoses, equipped with swing joints, are carried in accessible position on back platform. An operating light illuminates the rear deck. 1500 to 2500 gallon trailers are available for use with these units.

Size	4½" x 8"
Max. rpm	125
Max. Pressure	7500 lbs
Max. Discharge rate	200 gpm



INTERNATIONAL CEMENTERS, INC.

6505 Paramount Boulevard, Long Beach 5, California

ICI Oilfield Equipment

International Cementers, Inc., 420 Lexington Avenue, New York, New York, U. S. A.
"T. I. P. S. A." Avenida Roque Saenz Pena 501, Buenos Aires, Argentina, S. A.

WHY...

Gas engines equipped with ENSIGN Carburetors are most likely to give the best SERVICE

FRED LAUB
Research Engineer
Ensign Carburetor Company

While carburetion is but one important factor in gas engine performance, it is one that can trouble a field man no end.

With a full knowledge of field problems, we set out some years ago to build a Natural Gas and Butane carburetor simple enough that any mechanic could understand it, yet highly efficient and economical in performance.

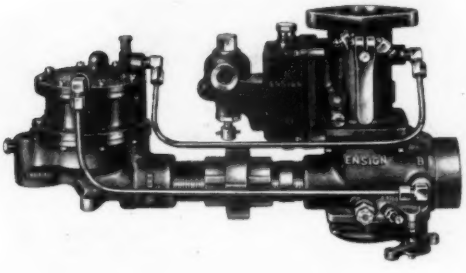
One difficulty in the carburetion of Natural Gas and Butane is the close range of flammability of these fuels. A little too rich or a little too lean and the mixtures refuse to ignite. By isolating starting mixtures from operating mixtures, we obtained excellent control of each without compromise. In effect, we built two carburetors into one. One carburetor for starting and the other for load operation. After the engine starts and is running well, the choke is fully opened. This cuts out the starting mixture and simultaneously opens the main mixture orifices. The Ensign Easy Starting Device was the result.

A low-pressure metering fuel regulator was then necessary to function in conjunction with our particular carburetor – a differential type regulator that would automatically shut off the supply of fuel when the engine was stopped. This brought forth the now famous Ensign Model "B" Fuel Regulator.

Ensign equipment is easy to understand, easy to adjust and service. Our service training program is designed to reach the young fellow too – the new man coming up. Field men everywhere know Ensign.

In almost 40 years of building carburetors, nearly two million units have been put in operation. Because of this wide acceptance and understanding of our products plus good all-around carburetor performance, we believe that gas engines equipped with Ensign will most likely give the best SERVICE.

We have an interesting booklet on the adaptation of Butane-Propane to gas engines. You may have this for the asking.



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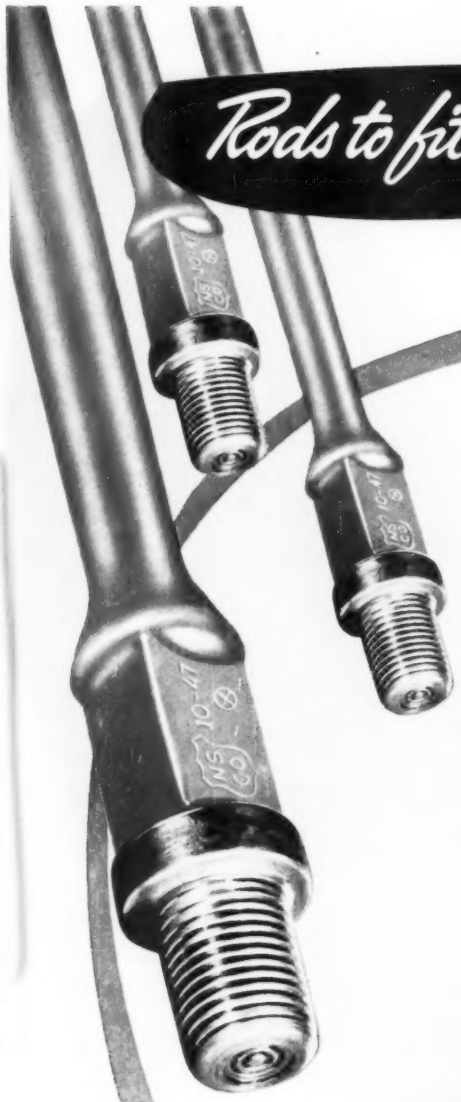
HUNTINGTON PARK, CALIFORNIA
Branch Factory: 2330 West 58th Street, Chicago 36, Illinois



Rods to fit the oil

Four grades of National Sucker Rods let you pick the rod that will give the best service under your particular load and type of oil.

Each grade is tailored metallurgically to withstand corrosion, shock, and fatigue . . . is engineered to resist shock and impulse loads.

And all four grades of National Sucker Rods are forged, upset, and threaded on specially-developed machines made to produce superior sucker rods.

National Sucker Rods are made to API specifications, in double-pin type in diameters from ⅝" to 1", in all four grades . . . 30 for light loads and non-corrosive fluids, 40 for heavy loads and non-corrosive fluids, 81 for heavy loads with severe corrosion but weak sulfides, and 91 for heavy loads with severe corrosive and sulfide conditions.

Ask your nearby National Supply store for details and descriptive Bulletin 354.

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EXPORT: NATIONAL SUPPLY EXPORT CORPORATION, 30 ROCKEFELLER PLAZA, NEW YORK, N. Y., U.S.A., RIVER PLATE HOUSE, 12 SOUTH PLACE, LONDON E.C.2.

IN ALL THE WORLD... NO WRENCH LIKE

ROXCO

it's individually **REGISTERED** *completely* **GUARANTEED!**

Special
MONEY-BACK TRIAL OFFER!

Buy *one* "Registered" Roxco and use it for your toughest jobs. If you don't agree it stands up better . . . is handier, faster to use . . . is a bigger value than any pipe wrench you've ever used . . . return *that one* trial Roxco direct to us (not the seller), within sixty days with a note of price paid and reason for returning. We will refund your money. This get-acquainted offer good until Dec. 31, 1950. Trimont Mfg. Co., Roxbury, Mass.

ENGINEERED BY STRESS ANALYSIS TO ASSURE HEAVY DUTY STRENGTH WITHOUT USELESS WEIGHT

See dark Hardened area

Now you need not accept useless, fatiguing weight in order to get a dependably strong wrench. Through stress analysis of every inch, the new Roxco was designed to put *extra* metal *where heavy stresses come*. And, to take out metal where it does *not* count.

The result is not only the handiest pipe wrench a man ever put to work, but also a wrench so strong that it exceeds, by a good margin, Federal Spec's for Heavy Duty Pipe Wrenches, Type II, GGG-W-651a.

So superior is this new wrench . . . so carefully quality-controlled . . . that every Roxco is individually *Registered* by number. And *every* part is *guaranteed* against breakage in any normal heavy duty use! The nine points below show why any wrench buyer and user will want the lighter, easier-to-work-with Roxco to boost efficiency . . . reduce tool costs. Order Roxco, now. Or send for folder and names of distributors.

1. Extra Strength Based on Stress Analysis: Extra metal at critical points provides higher resistance to failure. Protects work and worker. Withstands unusual stress in "side pull".

2. Lighter Weight Achieved: Stress analysis also showed where useless metal could be eliminated to produce a lighter, handier wrench.

3. Uniformity of Jaw Hardness and Strength: Both movable and insert jaws are of drop-forged alloy steel. Teeth are hardened by automatically-timed, localized induction process at wear points, yet the tough core of jaws is retained for strength.

4. Reinforcing Shoulder Behind Insert Jaw resists any unusual stress. Assures long, trouble-free service.

5. Rapid Ratcheting Action: New, simplified cushion action replaces complicated spring. With Roxco tooth design, it prevents seizure on pipe and permits fast ratcheting action — as fast as user can move his hand. Accurate fit of assembled parts eliminates lost motion — speeds jobs.

6. Comfort-Shaped, Palm-Fitting Handle: New wide handle design is more comfortable to use — makes work easier, cuts worker fatigue.

7. Reinforced Housing embodies a hammer face to break cast fittings.

8. Handy, Accurate Pipe Scale permits quick adjustment to desired size.

Special Metallurgical Formula: Roxco Metal, combined with scientific heat treating, means superior strength in housing and handle.

TRIMO-ALLOY WRENCH . . . Roxco's only Rival . . . is an all alloy-steel heavy duty pipe wrench. Different in design, but has power comparable to Roxco.

TRIMONT MANUFACTURING CO. Division of Aetna Industrial Corporation, 55 Amory Street, Roxbury 19, Mass. Makers of Wrenches, Pipe Cutters, Vises and Other Trimo Time-Tested Tools.

Where resistance to HIGH HEAT is essential . . .

GUN IRON CASTINGS

Where cast parts are subjected to high temperatures, Gun Iron and its alloys provide ideal properties. Basic Gun Iron maintains full tensile strength and hardness up to 850° F. and loses only 12% of strength at 900° F. By use of proper alloys this ceiling can be raised to 1000° F. In addition, growth is negligible up to 800° F. and amounts to only ¼ of 1% in linear dimensions at 900° F.

This unusual property of Gun Iron has solved many problems for users of industrial castings subjected to prolonged heats. Combined with superior resistance to frictional wear, erosion and corrosion, impact and pressure, it completes the requirements necessary for an iron that will give outstanding performance on the toughest casting assignments . . . and that is just what Gun Iron has been doing for over 139 years.

If these properties look like they can solve a design or maintenance problem for you, why not drop us a line. Our engineers, metallurgists and unexcelled laboratory facilities are at your disposal to help determine the specific economies of Gun Iron for your application.

GUN IRON *in the* PETROLEUM INDUSTRY

Hunt-Spiller casts and machines many parts for the petroleum industry. A few are listed below:

LINERS, PISTONS AND RINGS FOR HOT OIL PUMPS • BUBBLE CAPS AND TRAYS • TUBE SUPPORTS • PRESSURE CASTINGS

Chances are that there are many other places where Gun Iron can solve a design or operating problem. To help you determine the value of Gun Iron for your cast parts, our metallurgical department has prepared a comprehensive bulletin which contains complete properties and discussions of Gun Iron and many other metals. Engineers claim it an invaluable reference aid. Send for your free copy today.

HUNT-SPILLER GUN IRON • AIR FURNACE PROCESS • HSGI

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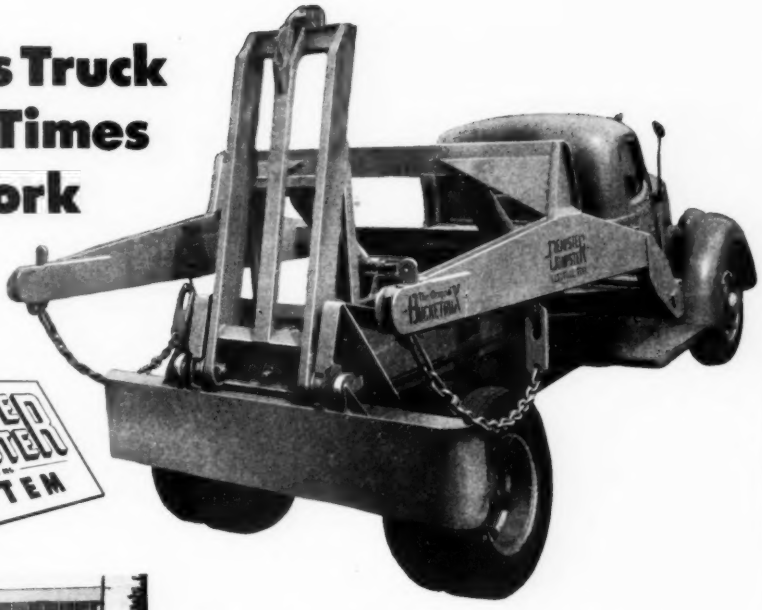
393 DORCHESTER AVENUE • SOUTH BOSTON 27, MASS.

Canadian Representatives: Joseph Robb & Co., Ltd., 4050 Namur St., Montreal 16, P. Q.

Now This Truck Does 10 Times More Work

In The DEMPSTER DUMPSTER SYSTEM



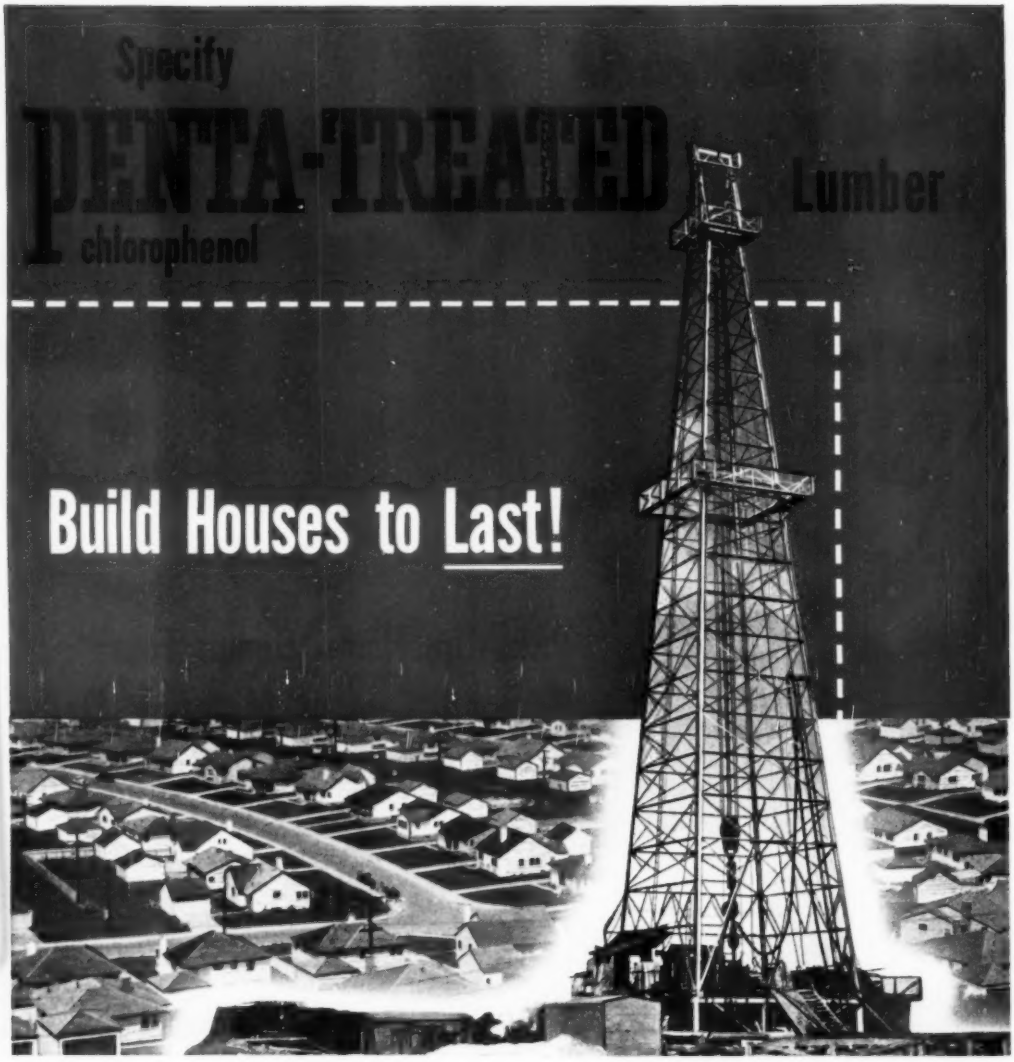
Picks-Up, Hauls, Dumps Four Railroad Cars of Materials Daily!

Before the Dempster-Dumpster Hoisting Unit was installed on the above truck chassis, it was one of 10 conventional trucks being loaded by hand. Now, the truck hoisting unit has replaced all 10 trucks. In many plants handling materials by the Dempster-Dumpster System, one Truck Hoisting Unit has replaced from 5 to 10 conventional trucks. In each plant a single hoisting unit handles many containers. In one particular installation, one unit serves 37 detachable containers of various types and sizes, ranging from 2½ to 8 cu. yds. This plant produces, daily, approximately 220 cu. yds. (about 4 car loads) of materials of every description, including rubbish, scrap and finished product. This daily output is handled in only eight hours by the Dempster-Dumpster equipment. Containers are spotted at materials' accumulation points throughout the plant. When each container is filled, it is picked up by the truck hoisting unit, carried to the point of disposal, set down intact or dumped and returned for refilling. The entire operation is hydraulically controlled and handled by only one man, the driver. This modern system is eliminating much equipment investment in industrial plants. It is cutting maintenance costs, tire and gas requirements. But, most important, it increases production with a minimum of manpower. Don't assume that your problem is different—that the Dempster-Dumpster System of materials handling is not applicable to your problem. Such cases have happened, only to discover later that this equipment was exactly the type needed. Our most difficult job in our advertising is to make the wide use . . . the flexibility and simplicity of the Dempster-Dumpster operation clear to the reader. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

Pictured at left is a standard drop bottom type container in three stages of operation—on the ground, in carrying position, and dumping.

DEMPSTER BROTHERS

530 Dempster Bldg., Knoxville 17, Tenn.



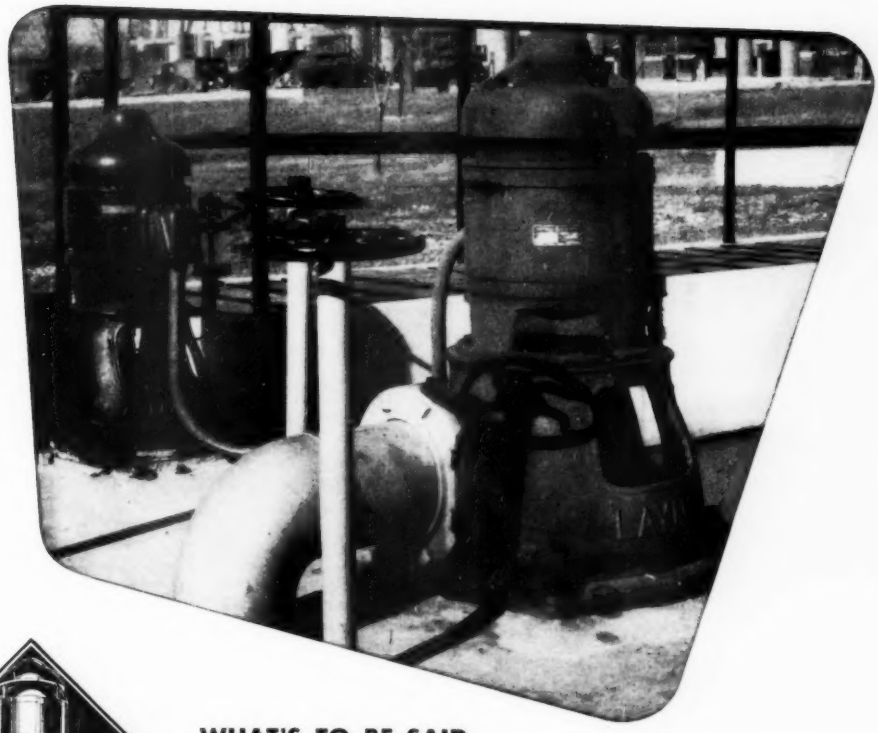
It's economical to use "PENTA"-protected lumber for oil field housing. PENTA water repellent solutions not only protect wood against termites and decay but prevent warping and checking as well.

PENTA-treated wood, properly treated, is paintable and gives *tested, proved* protection under severest climatic conditions.

Whether the houses are permanently located, or built to follow the oil, an investment in PENTA-protection will pay big dividends in reduced maintenance and rebuilding costs. For more information write Dow, Dept. PE 33.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW
penta-
chlorophenol



VERTICAL TURBINE PUMPS

—are built in sizes from 40 to 16,000 gallons per minute. They may be installed in existing wells, saving the expense of a new drilling job. Other uses include fire protection, booster service, cooling tower, river pick up and a wide range of other uses. Send for the Layne Vertical Turbine Pump catalog.

WHAT'S TO BE SAID

ABOUT SATISFIED USERS

The building of dependable water producing equipment involves a lot of extraordinary skill. And when it comes to skill Layne leans mighty heavily on seventy years of world-wide experience. It is from such experience that Layne has been able to find and strengthen weak points, use tougher and longer lasting materials and to constantly increase efficiency. As a result, users almost invariably stick to Layne equipment on each of their additional units.

It is a widely known fact that Layne Well Water Systems, point for point, always measure "head and shoulders" above any other make. This means that there is no advantage whatever in buying the so called "just as good" equipment. Furthermore there is no use telling you that this or that Layne part is super-duper. What you are buying—and have every right to expect, is unquestionably good performance over a long period of years. That, in brief, is exactly what Layne offers without reservations of any nature.

If you now need, or expect to have need for more water at some future date, get in touch with Layne, or send for further information, catalogs, bulletins, etc., Address

LAYNE

LAYNE & BOWLER, INC.
GENERAL OFFICES, MEMPHIS 8, TENN.

BUILDERS OF HIGH EFFICIENCY

WELL WATER SYSTEMS

ASSOCIATED COMPANIES—Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co. Ltd., Houston, Tex. ★ Layne-Western Co., Kansas City, Mo. ★ Layne Minnesota Co., Minneapolis, Minn. ★ International Water Corp., Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont. ★ Layne-Hispano Americana, S.A., Mexico, D. F. ★ General Filter Company, Ames, Iowa.

BARRETT* PROTECTIVE PRODUCTS

COVER EVERY PIPE-COATING NEED

1 **Pipeline Enamel**
2 **Millwrap Enamel**
3 **A.A. Enamel**
4 **Asbestos Felt**
5 **Materials for Special Uses**

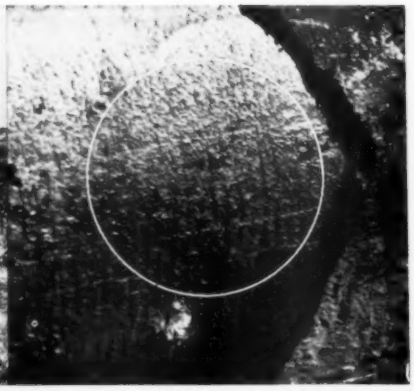
BARRETT* PIPELINE ENAMEL

After more than 20 years' use under the most widely varying conditions, Barrett* Pipeline Enamel has conclusively demonstrated its ability to protect pipe lines against corrosion. When used properly, the need for constant inspection by line walkers is practically eliminated, as far as leaks from corrosion are concerned.

Barrett Pipeline Enamel is reinforced with inert flake minerals which provide toughness and maximum resistance to underground stress effects. It is non-absorbent, and is impermeable by soil waters. Like other Barrett coal-tar enamels, it is practically unaffected by soil composition or bacteria. It can be depended upon to give uniformly satisfactory service under the most punishing conditions of underground service.

HERE'S PROTECTION THAT PROTECTS!

This line was protected in 1927 with Barrett Pipeline Enamel. When taken up for relocation 16 years later, the steel was found to be free from corrosion.



Note how clearly visible the original mill knurl marks are in this unretouched enlargement.

✓ *Memo:* FOR CORROSION ENGINEERS

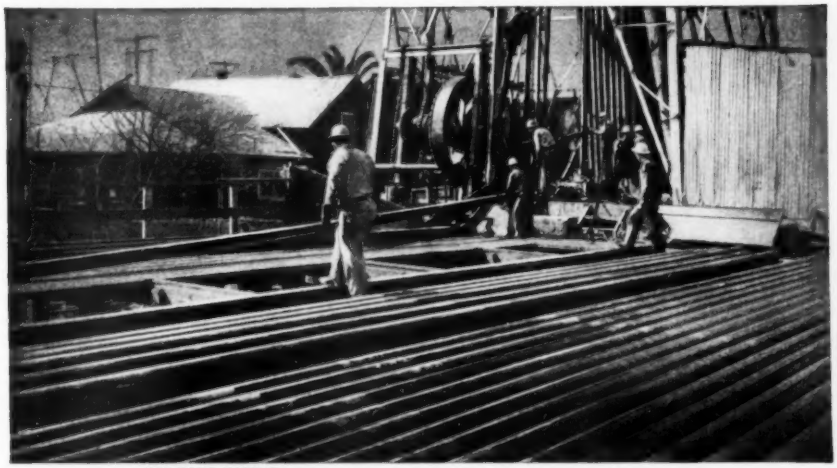
Barrett coal-tar materials for special uses are all dependable, durable and economical. Eternium* Paint for exposed metal work. CA-50 Heavy Duty Cold Application coating for concrete and metal exposed to extremely corrosive conditions. Marine Enamel for ships, barges and off-shore service vessels. Service Cement and Pipeline Fabric for field joints — no torching required. Asbestos Pipeline Felt for soil stress shield. Tank Bottom Compound for sour crude storage. 34 YB Paint for exposure to salt water spray conditions.

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

*Reg. U. S. Pat. Off.

DEPENDABILITY THROUGH



IN THE FIELD: Running seven-inch S-80 A. O. Smith Casing.

RESEARCH AND ENGINEERING

IN THE A. O. SMITH PIPE MILL: Automatic flash-welding machine, developed by A. O. Smith, simultaneously welds casing along its full length.

A. O. Smith Corporation 76th Anniversary 1874 1950

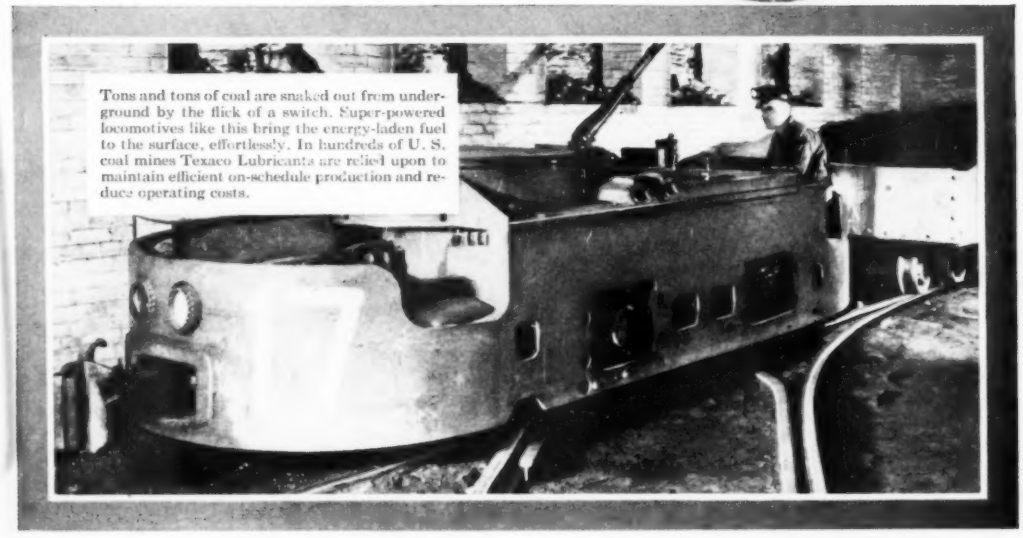
A.O.Smith
CORPORATION

CASING • LINE PIPE

New York 17 • Washington 6, D. C. • Atlanta 3
Pittsburgh 19 • Chicago 4 • Houston 2 • Dallas 1
Seattle 1 • Los Angeles 14 • Tulsa 3
International Division: Milwaukee 1

Rx for Aching Backs

Petroleum Progress Serves the Mining Industry



Tons and tons of coal are snaked out from underground by the flick of a switch. Super-powered locomotives like this bring the energy-laden fuel to the surface, effortlessly. In hundreds of U. S. coal mines Texaco Lubricants are relied upon to maintain efficient on-schedule production and reduce operating costs.

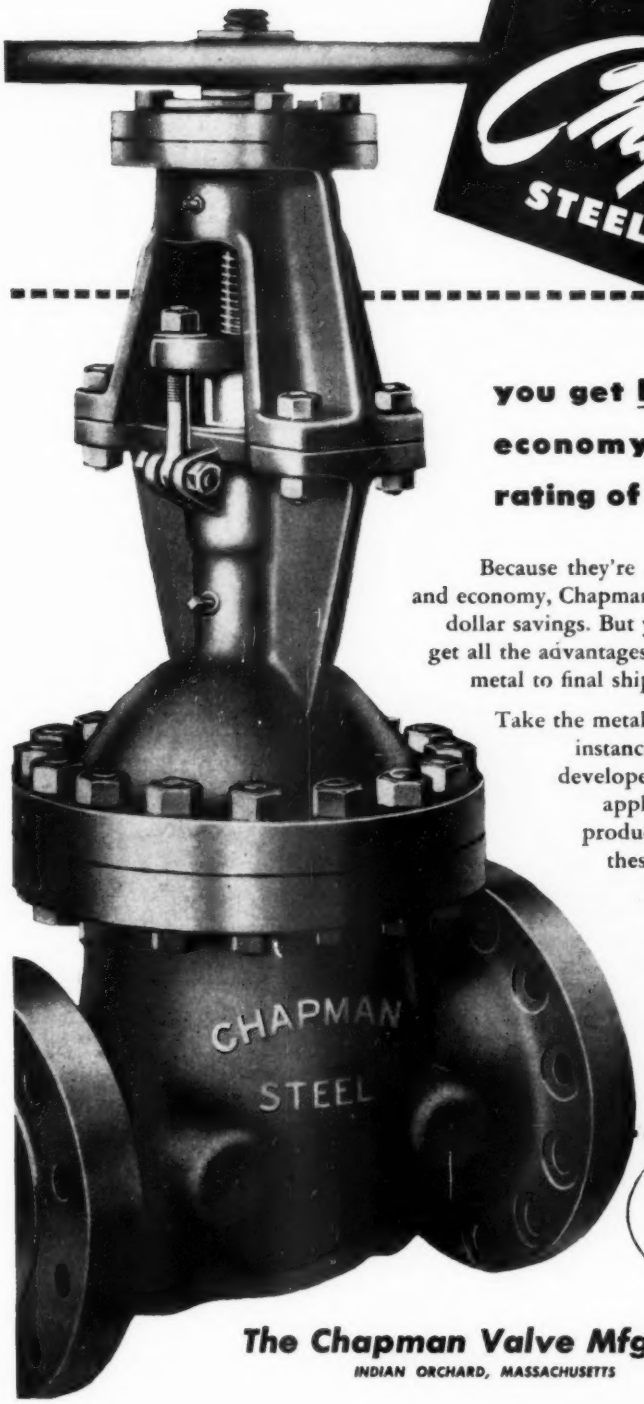
Digging, drilling, loading, hauling—modern mine machinery stands up against abrasive dusts, dirt, heavy loads and harsh conditions—with the aid of good lubrication.

Rugged underground locomotives, loaders, shakers, cutters and other vital equipment speed the mining of coal, ease the load of the miner. Operations beneath the earth's surface are rigorous, call for heavy-duty performance. Petroleum research helped immeasurably in perfecting these machines by providing efficient lubricants. Thus petroleum lends an invaluable helping hand not only to a great industry but to the one other highly developed source of world energy.

THE TEXAS COMPANY

Petroleum Promotes Progress

TEXACO



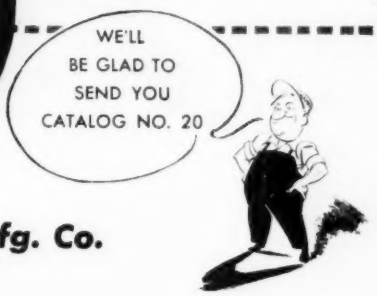
WITH Chapman STEEL VALVES

you get <u>both</u> production-line economy <u>and</u> the precision rating of custom-made valves

Because they're made with production line speed and economy, Chapman Steel Valves offer you important dollar savings. But you get more than just that — you get all the advantages of close quality-control from raw metal to final shipment to you.

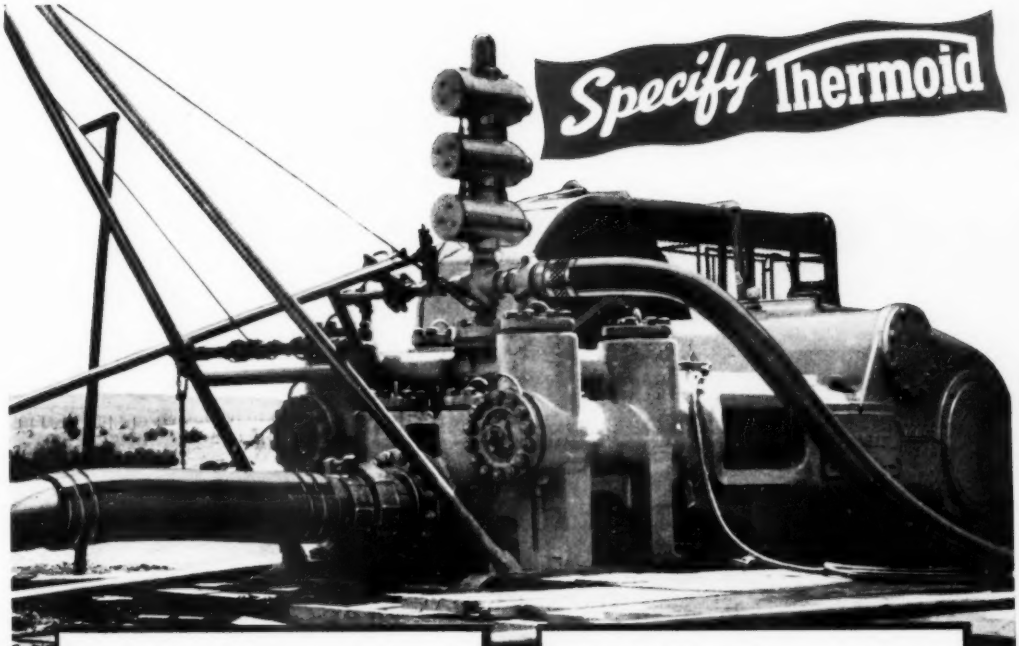
Take the metals these valves are made from, for instance. Chapman's own metallurgists developed the alloys best suited to each application. And they supervise the production of every operation each time these metals are produced in our own foundries. Just one of the many reasons why Chapman Steel Valves give you better service.

Why not write today for more information on these valves that offer you *both top quality and economy?*



The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASSACHUSETTS

ONLY MM OFFERS COMPLETE TEMPERATURE CONTROL!
MINNEAPOLIS-MOLINE
OIL FIELD POWER
MM oil field units maintain *uniform temperatures throughout the engine*—eliminating sludge . . . reducing number of oil changes . . . prolonging periods between servicing . . . greatly extending time between overhauls *even under the most difficult oil field conditions!* Heat exchanger base pan and by-pass thermostat help keep top-to-bottom temperature *constant* regardless of load or atmospheric temperature.
Skillful engineering and advanced design make MM Power Units steady, dependable power producers. High turbulence combustion chambers and controlled cooling contribute to high, efficient power output. Cylinder heads and blocks are removable for low-cost servicing. Precision-built shell type bearings are replaceable.
MINNEAPOLIS-MOLINE
MINNEAPOLIS 1, MINNESOTA
OIL FIELD EQUIPMENT
SECO
For complete facts on the extra performance, dependability, longer life and satisfactory service you get in MM Oil Field Power, consult:
SHRIMPTON MANUFACTURING AND SUPPLY CO.
Los Angeles 22, California, 2700 S. Eastern Avenue
Kilgore, Texas, 413 N. Commerce Street
Oklahoma City 8, Okla., 219 South Pennsylvania Ave.



Specify Thermoid

Mud-Flo Suction Hose

Permits raising and lowering of suction pipe and changing the position of intake without changing connections.

Tube —$\frac{3}{16}$" thick, oil-resistant, bonded to strong, open-weave breaker fabric.

Reinforcement—heavy galvanized round wire embedded in compound prevents collapse . . . gives maximum flexibility . . . adsorbs vibration and permits unobstructed flow. Strong, heavy, square woven duck plies.

Cover—oil-resistant . . . withstands severe abrasion and weathering.

Furnished with built-in grooved nipples.

Flexible Discharge Hose

Speeds rig-up and tear-down time between mud-pump and standpipe. Eliminates vibration that causes loosened connections and avoids sharp angles that cause pressure loss and turbulence.

Tube —Synthetic rubber . . . abrasion and oil resistant . . . free circulation and long life assured.

Reinforcement—Steel Cables and pre-stretched fabric for the greatest strength and flexibility.

Cover—Special vulcanized compound resists aging and abrasion.

Couplings —Streamlined steel . . . full flow built-in and anchored securely for the life of the hose.

It will pay you to *Specify* **Thermoid!**

Also First Choice Thermoid Powerflex Rotary Hose

The recognized leader in the field. Every length pre-tested to 5000 psi before shipment.

Thermoid Quality Oil Field Products: Oil Country Flat Beltings • Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Powerflex Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • Brake Blocks • F.H.P. and Multiple V-Belts.

SEE OUR CATALOG IN THE COMPOSITE CATALOG

Thermoid Company

Western Offices and Factory • Nephi, Utah, U.S.A.
Main Offices and Factory • Trenton, N. J., U. S. A.
Industrial Rubber Products • Friction Materials • Oil Field Products

They Say—

Fruits and Oil

Sir:

I would like to obtain figures pertaining to the production, transportation and storage of liquid petroleum gases in the State of California.

My inquiry is prompted by the recent proposal of William Smith, member of the Los Angeles County Board of Supervisors, that state legislation be passed banning the use of all grades of fuel, diesel and stove oil, for purposes of orchard heating for frost protection and requiring such heating to be done with liquid petroleum gases. My personal opinion—and I feel qualified to speak, having operated both the common oil burning orchard heaters and one of the very few L.P.G. orchard heating systems in California—is that liquid petroleum gases are a more economical and practical fuel for this purpose than the distillate oils, and they have the added advantage of smokeless burning, which is the reason behind Mr. Smith's proposal.

The citrus industry in California consumes millions of gallons of fuel, mostly diesel oil, during cold winters such as we have experienced the last 2 years, and the smoke problem during such periods is very great. Due to the great population influx into the Los Angeles area in recent years, the urban population influence now overbalances that of the citrus industry and distinctly threatens its existence with proposals to ban orchard heating as it is commonly practiced. Unless some method of frost protection without resulting "smudge" is developed, such as the use of L.P. gas for fuel, a great and prosperous industry may fall.

Clarence N. Livingston,
Claremont, Calif.

Editorial Bouquet

Sir:

The Independent Refiners Association of America compliments The Oil and Gas Journal for consistently publishing articles which accurately and completely reflect conditions in the petroleum industry.

That the I.R.A.A. members read and rely on The Oil and Gas Journal is evidenced by their constant reference to its content. The natural gas and gasoline committee of the I.R.A.A., in its study of the impact of recycling products on market conditions as affecting the independent refiner, felt that your editorial (February 16, page 65) greatly assisted in making clear the problem created by present regulations for the production of gas and condensate areas and that it emphasized the urgency of an immediate solution.

The . . . committee wired its findings to Railroad Commission Chairman William J. Murray. . . . This wire . . . stated the necessity of an immediate solution to the improper regulation of gas and condensate production.

Harry Leyendecker,
President, Independent Refiners Association of America,
Houston.

Why Depletion?

"An oil well is not like a factory. Except for normal wear and tear on buildings and equipment, a manufacturing plant can be expected to go on producing at approximately the same rate year after year without losing its productive capacity, and with only periodic need for new large-scale capital investment. But every time an oil well produces a barrel of oil it is that much nearer to exhaustion. Every barrel of oil brought to the surface drains away a part of its capital assets and diminishes the value of the property.

"So the oil producer, if he wants to maintain his producing level, must be constantly engaged in the search for new oil. That is roughly analagous to the problem that would face a manufacturing concern if it had to build a new plant, or add substantially to its present plant, each year.

Harrisburg

is keeping abreast of Flange needs in the oil fields . . .

OLD-TIMERS and youngsters, management men and engineers, distributors and field workers know from experience that *experience counts* in construction of Flanges for oil field piping.

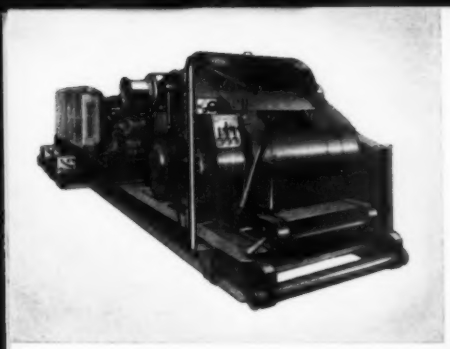
HARRISBURG'S 97 years of manufacturing experience pays off in threaded and butt welding Flanges of super strength and amazing thread accuracy. All *Harrisburg* Flanges are drop-forged and threads are unsurpassed in accuracy of height, angle, taper, and gauging.

MADE to A.S.A. standards, produced under constant rigid inspection, they are available for prompt shipment in small quantities or carload lots. *Use more of them in 1950!*

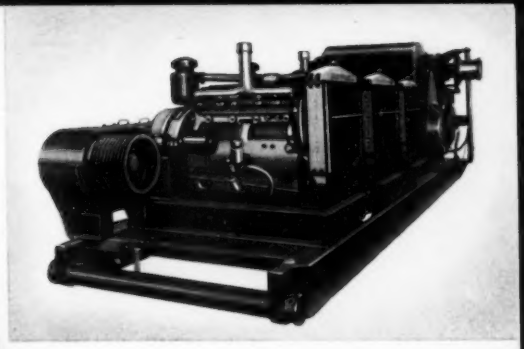
Consult your distributor, or write for *Harrisburg's* Flange Catalog.

Harrisburg STEEL CORPORATION
HARRISBURG 6, PENNSYLVANIA

97 YEARS IN PENNSYLVANIA'S CAPITAL



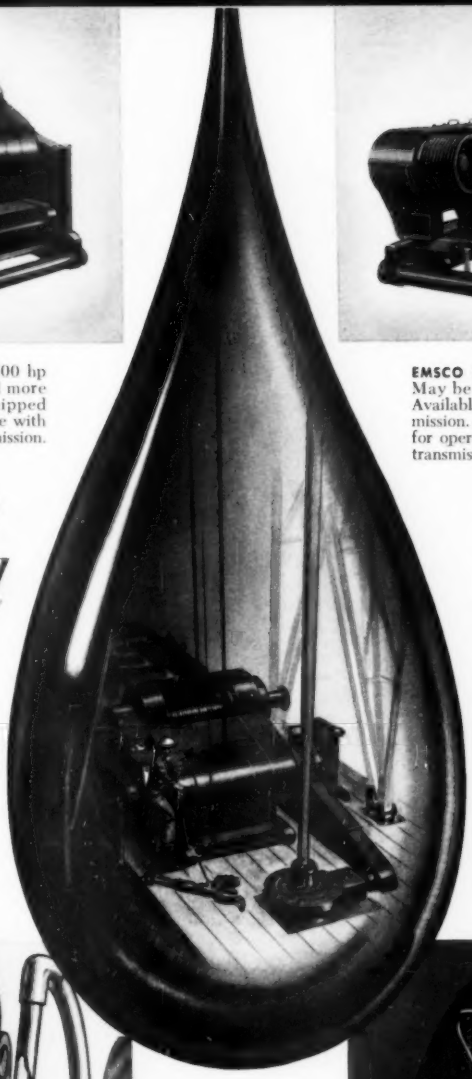
EMSCO GA-500 DRILLING RIG. A 500 hp rig designed for faster, safer and more economical drilling. May be equipped with or without sand reel. Available with 2 or 3 engine compounding transmission.



EMSCO GA-350 DRILLING RIG. A 350 hp rig. May be equipped with or without sand reel. Available with 2 or 3 engine compounding transmission. Push-button air controls are provided for operation of jaw clutches in selective speed transmission.

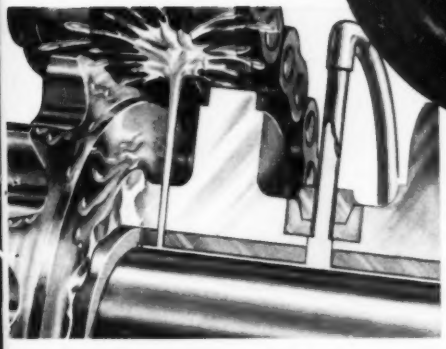
Pressure Lubricated Power!

EMSCO "GA" SERIES DRILLING RIGS

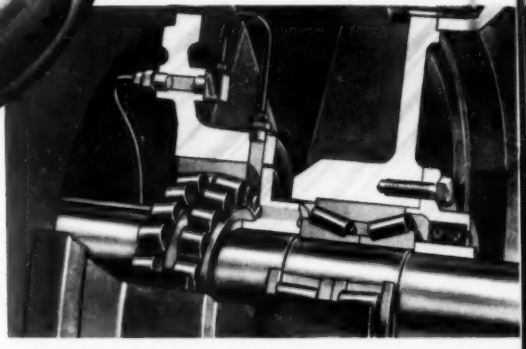


Completely Pressure Oil Lubricated from Pump Countershaft to Rotary Machine

Most drilling rigs utilize a grease system for lubricating shaft bearings and a splash system for oiling chain and sprockets. A few use both grease and oil for lubricating shaft bearings. But only Emsco "GA" Rigs have complete pressure oil lubrication of all bearings, chains and sprockets. Time normally used for lubricating the rig is converted to profitable drilling. Inefficient lubricating nipples and drip systems are eliminated. Wear is minimized; rig service time reduced; troublesome grease fittings eliminated. This force-feed oil system is just one of many features that make Emsco "GA" Rigs outstanding for medium depth drilling.



UNIQUE "OIL-SPRAY" SYSTEM.* All chains and sprockets are lubricated by a positive force-feed spray system. Oil flows through hollow hubs of sprockets into path of chains, thoroughly lubricating all working parts, reducing wear, assuring longer life.



PRESSURE OIL LUBRICATED BEARINGS. Two gear-type pumps force-feed oil-lubricate all bearings and chains. Each bearing has its own supply of clean, filtered oil. Grease fittings are eliminated. Oil flows through bearing assemblies. This flushing action keeps bearings clean and free from foreign matter.

**Patent Pending*

CONTINENTAL

ADV 50F-50

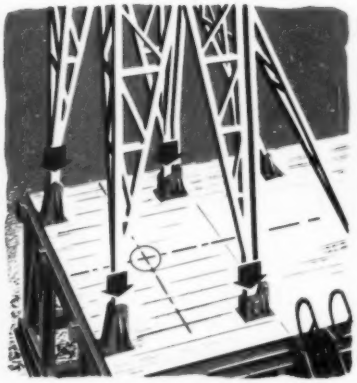
THE CONTINENTAL SUPPLY COMPANY

General Offices: DALLAS, TEXAS • The Continental Supply Co., Limited, 216 Lancaster Bldg., Calgary, Alberta • Export Division: The Continental Supply Company, Inc., 50 Rockefeller Plaza, New York, N. Y. • Representatives: Argentina • Bolivia • Brazil • Chile • China • Colombia • England • Ecuador • Peru • Trinidad • Uruguay • Venezuela

Here's What Emsco's Exclusive Bulge Feature Means to You...

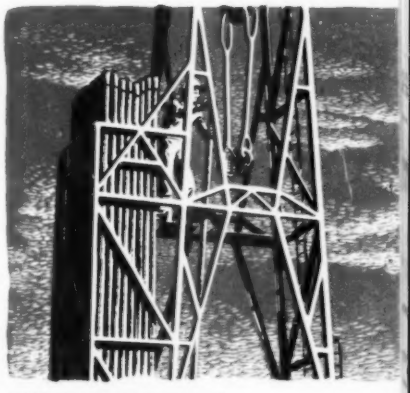
GREATER WIND RESISTANCE

All Emsco portable masts are designed to safely withstand *actual* wind velocities of 75 mph with full setback of pipe, or 100 mph on naked mast. This is nearly 3½ times the resistance to wind pressure as that of masts designed for 70 mph *indicated* wind velocity. These wind load capacities indicate the structural rigidity inherent only with the Emsco bulge design.



EQUAL LOADING OF ALL FOUR LEGS

The erection gin pole is not an essential part of Emsco bulge type portable masts. It is used only for raising and lowering operations. Emsco masts have equal loading of all four legs. This provides crown block capacities far in excess of those obtained with open face masts, of equivalent leg size, which depend upon erection gin pole for support of back legs.

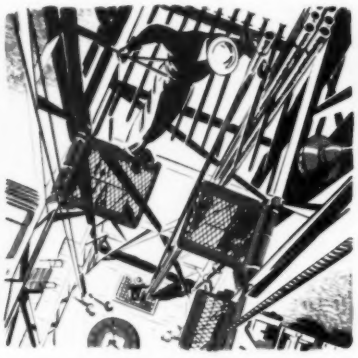


MORE RACKING CAPACITY

Emsco's exclusive bulge feature permits racking of more drill pipe than can be racked safely in any other type portable mast. Drill pipe inside bulge is racked and supported securely. Emsco Series 18, 136' masts may be equipped with one or two bulges. Two bulges permit simultaneous racking of both drill pipe and tubing on marine workover locations.

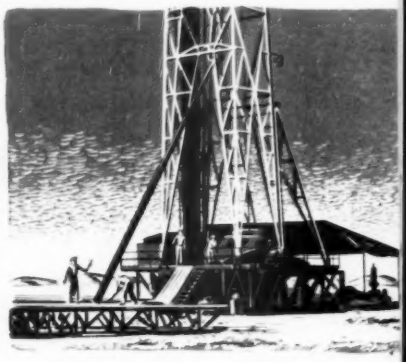
PERFECT VISIBILITY

All four faces of the mast are structurally laced together. No interior bracing is required. The absence of interior bracing coupled with racking of pipe entirely within the mast but outside the normal opening of the mast at the working platform level, provide unobstructed visibility for both driller and derrick man.



SAFE WORKING PLATFORM

Split-board type working platform insures maximum safety and affords unobstructed view of derrick floor. The derrick man, with one foot on each board, is placed squarely in front of the center line of the hole. This convenient position enables him to step to either board, or back onto the heavy fingers when handling pipe.

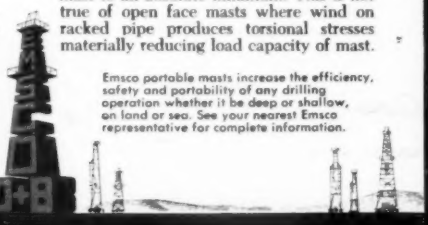


RUNNING CASING WITH PIPE IN BULGE

The exclusive bulge feature permits running casing with drill pipe in bulge. The "V" window is always open. The pipe rack is positioned to reduce torsional loading on mast to an absolute minimum. This is not true of open face masts where wind on racked pipe produces torsional stresses materially reducing load capacity of mast.

ONLY EMSCO BULGE TYPE PORTABLE MASTS OFFER ALL THESE OUTSTANDING ADVANTAGES

Emsco portable masts increase the efficiency, safety and portability of any drilling operation whether it be deep or shallow, on land or sea. See your nearest Emsco representative for complete information.



508

CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

EMSCO DERRICK & EQUIPMENT COMPANY

Houston, Texas • LOS ANGELES, CALIFORNIA • Garland, Texas

Distributors:
Mid-Continent: THE CONTINENTAL SUPPLY COMPANY, Dallas, Texas
Canada: THE CONTINENTAL SUPPLY CO., LIMITED, Calgary, Alberta
Export: THE CONTINENTAL SUPPLY COMPANY, INC., New York, N. Y.

EMSCO

The cost of searching for new oil, with wells now being drilled deeper and deeper, is high. And, as anyone with even the most casual knowledge of the oil industry can testify, it is an extremely hazardous and uncertain business.

"The depletion allowance of 27½ per cent of the gross income of each oil producing property is in no sense a loophole in the tax laws but a percentage fixed by Congress in 1926 as a result of actual experience in the rate of exhaustion of oil fields. It is entirely in accord with the principle that capital should not be taxed but only the income from capital. It is recognition also of the high risks involved—risks which make it possible that the producer has sunk much money into drilling dry holes before he brought in the well on which he is allowed to recover his capital tax free."

Editorial in the Fort Worth Star-Telegram.

Journal Saver

Sir:

Since I am not exactly a new subscriber BUT an ardent saver of articles from The Oil and Gas Journal I would like to catch up on the Engineering Fundamentals offer and order both the No. 1 and No. 2 manuals.

I notice in my latest copy of the Journal that the No. 1 manual starts with installment 300. If it is possible to get the entire series, please send it to me—I don't care what it costs.

I would like to mention to you, and with justifiable pride, that my OGJ file has become the only undisputed source of information that is available to the chief engineers, inspectors, designers, and draftsmen on this project. *(Editor's note: Frederick Snare Corp. is contractor on the Sinclair refinery project at Puerto La Cruz, Venezuela).*

Lou Kashdan,
Frederick Snare Corp., Puerto La Cruz, Venezuela.

Carbon Black for Farmers

"A boon to farmers appears to be in the making in experimental tests with carbon black and soil temperatures. Carbon black, which comes from natural gas, has been used successfully to raise soil temperatures.

"In the experiments, 2 tons of carbon black per acre were mixed into the top 2-in. layer of sandy loam. Surface and near-surface temperatures were recorded every 15 minutes for more than a year. It was found that the soil containing carbon black absorbed more heat from the sun than untreated soil. If an economically feasible procedure can be worked out, farmers may be able to defrost their land for earlier planting in the spring, and postpone their first fall frost to give late crops more time to mature.

"The tests represent only one of the many ways in which petroleum research has contributed immeasurably to the farmers' important job of supplying the nation with food."

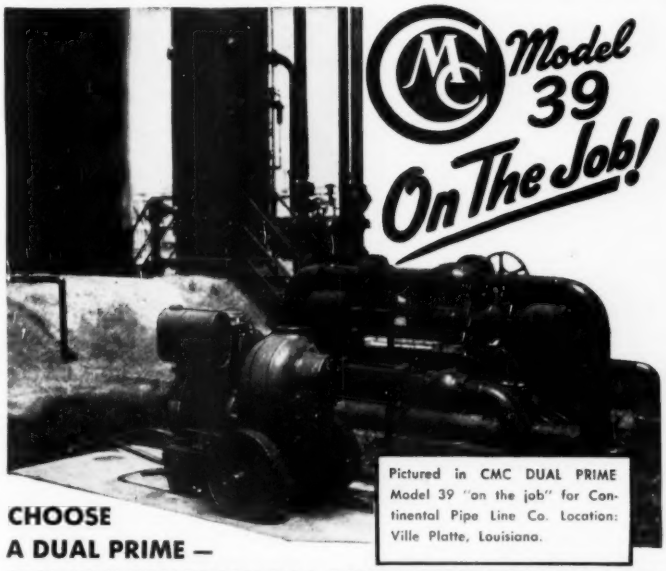
The Sohioan, Standard Oil Co. of Ohio.

Higher Rate, Smaller Income

"Mineral resources are natural deposits containing valuable ingredients which can be exploited profitably. When the proceeds from the disposition of the valuable ingredients of any deposit are inadequate to meet the costs of production, the deposit loses its label as a 'mineral resource.' It is converted into waste. As taxes on mineral resources are increased, more marginal deposits are converted into waste.

"When the burden becomes too heavy, mines and quarries are shut down; ghosts invade our mining camp; men lose their jobs; suppliers lose their trade; stockholders lose their dividends; processors and refiners lose their raw material; and Uncle Sam and the State lose their taxes on the profits of the operator, the wages of the labor, the royalties of the owner, the profits of the tradesmen. Thus, although the tax rates have been increased, there is a net decline in the flow of revenue."

Granville S. Borden, San Francisco attorney, addressing A.I.M.E. meeting, New York.



Pictured in CMC DUAL PRIME Model 39 "on the job" for Continental Pipe Line Co. Location: Ville Platte, Louisiana.

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JOURNALLY Speaking

That Leopard

THE Saturday Evening Post doesn't get all the breaks, even though it is famous for its luck in having a big news story coincide with an article planned weeks earlier.

The week that Oklahoma City's loose leopard was on the front pages of every newspaper in the country, some 900 billboards unfurled a picture of a leopard advertising Esso lubrication service with the slogan "all spots checked."

"How timely can you get?" bragged Esso Standard's advertising men. But they had to admit that they had scheduled this poster months ago.

We are glad to congratulate Esso on calling its spots so fortuitously. Up till now, try as we would, we couldn't find any oil angle to justify mentioning that leopard in this publication.

Mail Must Go Through

WE can readily understand how an oil man's week is utterly ruined if the Post Office fails to deliver his copy of our favorite oil publication on time. But so far none of them has had to resort to the extreme measures taken by a couple of governments to make sure that the good, old, yellow-covered book arrives.

The Ministry of Fuel Industry of the Central Government of China advises us that due to a temporary change of address it is not picking up its mail at Peking at the moment, but if copies of The Oil and Gas Journal are sent care of a Hong Kong book store they will be saved for it until a forwarding address has been established. And the same week the Ministry of Fomento of the Government of Venezuela authorized airmailing the Journal to it at a cost of around $180 per year.

As a general rule we aren't too anxious to have government employes as subscribers, much preferring operating oil men. But we are glad to serve officials dealing with petroleum matters, and we realize that some other government officials have to keep abreast of our industry and therefore must get our magazine. And when any government oil official, domestic or foreign, wants the Journal as badly as these two do, we are flattered to comply.

Throng Threat

A SPEAKER at a recent meeting of the American Chemical Society predicted, according to a newspaper report, that automobiles which never need to change oil because they are lubricated with fluorine, "may soon be thronging the highways of America."

Something should be done to prevent this. Not only is this a serious threat of competition to the oil industry on the part of the fluorine industry (if any), but our highways are already too badly thronged with automobiles which have to stop now and then to change oil.

Pipe Course

WE see by the papers that Texas Technological College is attempting to drill a dry hole on its campus at Lubbock, taking every precaution to make sure it is a duster so its petroleum engineering students can play around with experiments without being bothered by any messy, smelly crude oil.

That ought to lend itself to some sort of pertinent or impertinent comment. We could suggest that it is slightly ungracious of Texas Tech to deliberately drill a dry hole when much of its operating funds comes from successful wells, but we will confine ourself to expressing the hope that the students get more out of this than we got out of some of the dry-hole courses we took in college.

—Henry D. Ralph

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DO YOU KNOW HOW "Metal Petals" BRING YOU SUCCESSFUL CEMENTING RESULTS?

In any cementing where a lower zone must be protected from contamination by the cement slurry (as well as from sloughings or cavings) the Baker METAL PETAL Basket will be found both safe and successful.

The unit is constructed of a number of individual "petals" made of flexible sheet metal. These petals are mounted on reinforcing spring steel ribs, which in turn are mounted on a ring to form the Basket.

When running in the hole, the upward pressure of the fluid tends to close the "petals" thus providing fluid passageway between the Basket and the walls of the hole, without distortion of the Basket. As soon as the casing comes to rest, upward pressure by the fluid is relieved and the petals expand to contact the walls of the hole. Any tendency of fluid to move downward then presses the flexible petals more firmly against the entire circumference of the hole. Solids strained from the fluid tend to build a bridge inside the Basket which is thus converted into a one-way packer of great strength and effectiveness.

SIMPLE, EFFECTIVE ACTION

The "Metal Petals" not only expand to contact the entire circumference of large diameter holes, but also pack-off in holes of irregular shape; and the independent action of the individually mounted overlapping petals permits successful use of the Basket in casing programs with minimum clearances.

All-metal construction and design provide ample strength; lessen the possibility of splitting or otherwise damaging the Basket while it is being run in; and the metals are unaffected by usual acids employed for various purposes.

MOUNTINGS TO MEET ALL NEEDS

Baker Metal Petal Baskets are furnished mounted on plain or perforated nipples; with or without different types of Baker Whirler Float Collars; for a wide range of cementing applications. When conditions permit, it is recommended that Baker Metal Petal Baskets be "slidably" mounted to allow rotation, spudding, or reciprocation of the casing without distorting or damaging the Basket. Maximum efficiency of Baskets is assured when a Baker Model "G" Casing Centralizer is used immediately below the Basket assembly. For details see the Baker (or Composite) Catalog; or ask any Baker representative for specific recommendations.

TOP, Baker Metal Petal Basket (Product No. 340) ready for assembly into any required cementing hook-up. The strong, spring steel ribs, each with a "metal petal" attached, expand against the wall of the hole to form a safe "one-way" packer which prevents downward movement of the cement slurry.

LOWER VIEW illustrates the overlapping "petals" (each mounted on its individual spring steel rib) thus providing flexibility and freedom of expansion to pack-off around the circumference of large-diameter holes, or holes of irregular contours. A Baker Model "G" Casing Centralizer mounted just below the Basket is recommended.

LEFT, a popular hook-up consisting of a Baker Metal Petal Basket mounted on nipple, with a Baker Cement Whirler Float Collar with Solid Baffle (Product No. 305) which causes the cement slurry to pass through the baffled, side-whirler ports.

RIGHT. Where the casing is to be rotated or reciprocated while cementing, the Metal Petal Basket is "slidably" mounted between two Stop Rings. This permits free rotation, and ample vertical movement of the casing, without distorting or damaging the Basket.

HERE'S AN EXAMPLE OF STRENGTH

The Baker Metal Petal Basket holds a record for keeping cement ABOVE and OUT OF a "zone" possessing *lower formation pressure* and *higher permeability* than is likely to be encountered in any oil well. The "zone" was an *open* coal mine stope (lateral) through which a 16-inch hole had been drilled. A Baker Metal Petal Basket, mounted on 10¾" casing (used as the surface string) successfully supported a 640-foot column of cement slurry above the stope, without breakdown or leakage. This example not only demonstrates the bridging ability of the Basket assembly, but also is evidence of the tremendous structural strength which it possesses.

BAKER METAL PETAL BASKET PRODUCT NO. 340

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

Court of Last Resort

Nothing that has happened recently in our domestic affairs has brought more unfavorable comments from the press and on the air than the sudden settlement of the coal strike.

There is general agreement that, after defying owners and management, the President of the United States, and public opinion on several occasions, the miners' union in this instance got what it wanted by devising a method of getting around the law and the courts.

We will go along with these conclusions except for that part having to do with public opinion. Oil and natural-gas companies have on their books considerable evidence that this misguided union, the victim of a ruthless leadership, has not successfully defied the public.

Because the latest agreement does not finally solve a single economic issue involved in the mounting problems of the coal industry, and at best is a temporary respite from the recent critical conditions, a study of what has happened in fuel-consumer markets is of interest.

The action of a large eastern public utility is representative of that taken by many large fuel consumers. This company requires the equivalent of about 6 million tons of coal annually. Except for small quantities, coal was formerly used as fuel. Last year, as the coal situation tightened, the company shifted to fuel oil. The proportion of oil jumped to 60 per cent.

Although the company has large investments in facilities to burn coal, including storage, it will not return to coal for more than 50 per cent of its future fuel requirements. Lower oil quotations and constantly mounting coal prices have made fuel oil definitely more attractive than coal as to costs. To effect further economies and to minimize its dependence on coal, deliveries of natural gas from Louisiana and Texas will start this fall.

In the same area thousands of home owners have converted from coal to furnace oil and gas. New housing, with rare exceptions, provides for fuel other than coal because buyers insist on the economy, the protection, and service of the fuels provided by the oil country.

The net result is that the coal industry has permanently lost additional sizable markets. Observers agree that the soft-coal mines will do well to retain 450 million tons annually of what in 1948 was a 600-million-ton outlet.

The Bureau of Mines estimates that last year coal accounted for 38 per cent of the energy supply in United States compared to 48 per cent in 1946. For the same period oil jumped from 35 to 39 per cent and natural gas from 13 to 18 per cent.

Economic laws directed by public opinion have a habit of asserting themselves even in times when other controls over human affairs appear to have gone into an eclipse. Furthermore, there can be no evasion or appeal from the decisions of this court of last resort.

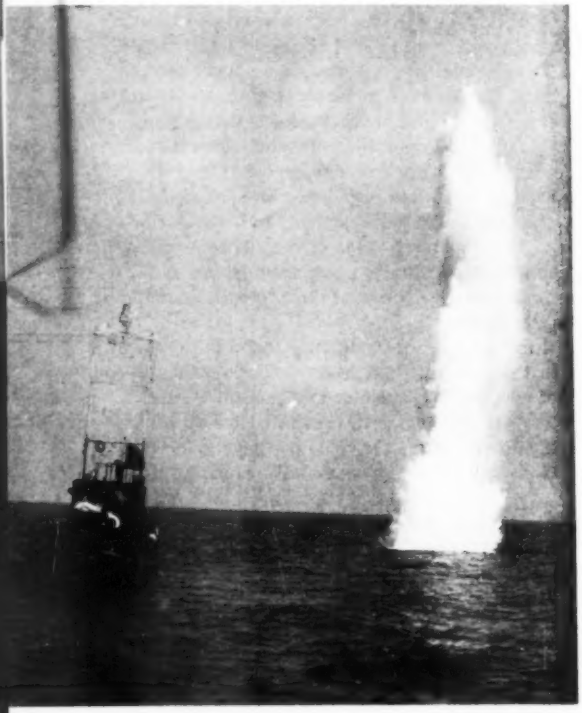
THIS WEEK

IMPORTS—Import quota on crude will be restored by abrogation of Mexican trade agreement, planned by administration soon. . . . Will mean higher duty for 95 per cent of imports. . . . ¶January imports of crude and products totaled 886,800 bbl. per day, another new high. . . . ¶Commerce official tells Congress oil imports not really harming domestic industry and aid nation's economic program. . . . Opposes any restrictions. . . .

TEXAS—Railroad Commission hearing this week will get complaints against new proration method. . . . Many refineries can't get right types of crude. . . . Several alternative formulas suggested. . . . ¶Producers' association raps heavy Texas curtailment. . . . Says other southwestern states not doing their share. . . . ¶Scurry County operators form engineering committee, order wells shut down for tests. . . . ¶Canyon reef apparently extended 17 miles north. . . .

STERLING SQUABBLE—State Department plans stiff counterproposal to British ban on sales of oil from dollar sources. . . . Apparently convinced British action is deliberate discrimination against U. S. oil, not merely effort to conserve dollar exchange. . . . ¶Proposed legislation would permit administration to retaliate against imports of British oil. . . .

INDUSTRY AFFAIRS—A.P.I.-A.G.A. report shows reserves of crude, natural gas, and petroleum liquids increased substantially during 1949. . . . ¶Standard of California plans major refinery revamping and new construction to decrease production of heavy fuel. . . . ¶Utilization of casing-head gas in Texas increasing rapidly. . . . Now a major supply for processing plants. . . . ¶More details revealed on Sinclair's ultraliberal pension and benefit plan. . . .



TRENDS—Gulf-East Coast distillate inventories amounted to 28,241,000 bbl. on March 4, down 3,617,000 bbl. from the previous week and 3,927,000 from same week in 1949. . . . For same areas, kerosine stocks were 2,610,000 bbl. less than a year ago. . . . Residual stocks were down 7,280,000 bbl. . . . Stocks of gasoline were up only 827,000 bbl. . . . ¶Big drop in primary distillate stocks on East Coast indicates very low secondary inventories. . . .

ACTIVITY—Crude production averaged 4,761,725 bbl. daily for week ended March 11, down 87,250 bbl. daily from previous week. . . . ¶Total well completions gained 17 for the week to 694 wells. . . . ¶Wildcat completions increased 23 to 139 wells. . . . ¶Rotary rigs operating in United States on March 6 totaled 1,962 rigs, an increase of 35 since February 27. . . .

INTERNATIONAL—ECA reports Marshall-plan countries will need more crude, less products, next year. . . . Imports will be more from nondollar sources. . . . ¶France making bid for early construction of Iraq pipe line. . . . Says more Kirkuk crude vital to nation's economy. . . . ¶Shell of Canada abandons exploratory work in New Brunswick. . . . ¶Several German discoveries improve country's crude outlook. . . . ¶Russians believed to have found new field in Austria. . . .

TECHNOLOGY—New tests on "swirl" in combustion chambers show octane performance of motor fuel can be improved by mechanical means. . . . Further evidence that auto design can temper the "octane race." . . . ¶Colorado oil shale being shipped to Sweden to test Swedish retorts for possible use in United States. . . .

REFINING—New fluid catalytic cracking unit at Wood River Oil & Refining Co.'s Hartford, Ill., refinery put on stream. . . . Capacity of the plant raised to 30,000 bbl. daily. . . . ¶New combination crude-distillation and delayed-coking unit now on full stream at Lima refinery of Standard Oil Co. (Ohio). . . . ¶Sunray Oil Corp. reports its cracking unit at Duncan, Okla., operated at 99.93 per cent efficiency during its second year on stream. . . .

NATURAL GAS—FPC report shows 2,637 miles of natural-gas pipe lines, costing $195,587,697, were approved during last half of 1949. . . . Capacity of new lines will be in excess of 1,000,000 M.c.f. daily. . . . ¶Number of small Illinois gas companies urge FPC to approve Texas-Illinois Natural Gas Pipe Line Co.'s 1,300-mile natural-gas line from Texas to Joliet, Ill. . . .

OFFSHORE.—This week the Supreme Court of the United States refused the request of Texas to defer arguments in the federal suit claiming ownership of offshore oil lands, and the cases against Texas and Louisiana will be heard March 27. Meanwhile the search for oil goes on under state leases, as with this Cities Service seismograph crew in the Gulf of Mexico.

Import Quota Restored

Mexican trade agreement will be abrogated, putting back 5 per cent quota on crude imports under Venezuelan plan

Bertram F. Linz

WASHINGTON.—The mutually unsatisfactory reciprocal trade agreement between the United States and Mexico will be abrogated by both countries jointly in the near future, bringing back into effect the provisions of the earlier trade agreement with Venezuela setting quota limitations upon oil imports.

Just how soon the abrogation of the Mexican agreement will be announced has not yet been determined, but estimates place the period at from 2 to 5 or 6 weeks.

Announcement of abrogation, however, will not restore the quota system immediately, since provisions in the agreement require 30 days' or 6 weeks' notice of termination depending on the basis on which it is based.

Discussions of a possible new agreement between the two countries have been held intermittently over a period of some 18 months, but it is understood no satisfactory basis for one has been reached as yet. From the standpoint of the United States, Mexico has not lived up to the terms of the agreement because of barriers it raised a year or more ago to imports of certain products from the United States. It is understood, also, that the agreement has not been satisfactory to Mexico.

Quotas complicated. — With the termination of the treaty in sight, some thought is being given to the handling of the quota question, which is complicated by the entry into the import picture of the Middle East as a source of oil receipts since the original Venezuelan agreement was entered into in 1939. The quota arrangement was suspended January 1943 when the agreement with Mexico became effective.

Under the Venezuelan agreement, imports of oil at the reduced import taxes provided for therein were limited to 5 per cent of the total quantity of crude oil processed in continental United States refineries, each year's quota being based on refinery operations of the preceding year. While oil could be imported in excess of the quota, such imports would be taxable at the full rates.

The full rates, as set by the 1932 revenue act, were ½ cent per gallon, or 21 cents per barrel. The Venezuelan agreement covered crude petroleum, topped crude, fuel oil, and gas oil, and cut the rates in half, making them 10½ cents per barrel, for imports within the 5 per cent quota.

Under the quotas in effect prior to the Mexican agreement, Venezuela was allocated between 70 and 72 per cent of the total, the Netherlands 20 to about 21.5 per cent, Colombia 3 to 4 per cent, and all others from 3.8 to around 5 per cent, Mexico coming in the last category. These percentages were based on the historical pattern of oil imports as it then existed.

The Middle East now has built up a pattern of oil exports which will have to be considered in setting up any new quotas, and if the Mexican agreement is terminated it is expected an interdepartmental committee will be set up to study the matter. The quotas determined would be announced by the President in a proclamation.

Imports Defended

Commerce official tells Congress imports have not hurt domestic oil industry much but aid national economy

WASHINGTON. — Possibility of "a diminution in the industry's incentive to explore and develop resources" is inherent in the existing oil-import situation, but the administration is opposed to any form of official control, Assistant Secretary of Commerce Thomas G. Blaisdell declared last week.

"If we want to stop imports we know how to do it," Blaisdell told the House interstate commerce oil subcommittee during hearings on the petroleum situation.

Increased imports last year undoubtedly contributed "to some extent" to the decline in domestic crude production, Blaisdell said, but "it is questionable whether this decline in production has been materially injurious to the industry as a whole" and drilling statistics indicate that the health of the domestic industry has been maintained.

Not "new" competition. — Blaisdell took the position that much of the imports consist of residual fuel oil and wax-bearing crudes which supplement inadequate domestic supplies and cannot be considered as "new" competition to domestic oil.

But he also enumerated a number of other factors entering into the import picture, such as the fact that 76 per cent of our imports are from Venezuela and the Netherlands West Indies, the great bulk of which, together with the 12 per cent from the Middle East, originated in concessions owned by American oil company affiliates or subsidiaries, which are bona fide American companies owned by American stockholders "and as such deserve the support of the United States Government to the same extent as United States industry here."

While these imports undoubtedly had some impact on the domestic industry, there also was a drop in demand which Blaisdell explained was in part due to the fact that a seriously impaired inventory position was improved during 1948, exaggerating the demand for that year.

Probably the greatest and most long-lasting effect that might be expected from protracted curtailment of domestic production, he said, would be the impairment of the industry's incentive to search for and develop new resources, but the record for 1949 shows that while production fell last year footage drilled set a new record. He admitted, however, in response to an inquiry by Rep. Lindley Beckworth of Texas, that some segments of the industry might have experienced adverse effects from imports.

Importance of imports.—"The question of imports of petroleum goes deeper than their impact on the domestic oil-producing industry," Blaisdell said. "The significance to that industry must be weighed against the importance of imports to our national economy and national security."

Our international trade in oil is an important segment of our total trade, amounting to approximately 5 per cent of our exports and about 7 per cent of imports, and the growing proportion of total imports represented by oil points up another significant feature of our international trade in that commodity, its contribution to the import side of our over-all trade position.

"With a further reduction in the exports of high-value petroleum products likely, this contribution of petroleum imports to closing the dollar gap will become more important," he pointed out.

Equally important, he told the subcommittee, oil imports carry out our international political and economic policy of nondiscriminating trading and freer trading throughout the

WATCHING WASHINGTON

Bertram F. Linz

Bread on the Waters

President Truman's horrible example of tax evasion—the man whom he said evaded taxes on his million-dollar-a-year income by using it to drill for oil—really was a public benefactor, it would appear by the argument presented by John E. Hughes, Chicago attorney and oil operator.

Commenting on the depletion allowance fight in a letter to Rep. Ralph E. Church of Illinois, Hughes intimated that if enough men with million-dollar incomes could be induced to go into oil development the Treasury would be better off financially.

The President's horrible example who sank $1,000,000 a year into oil for 5 years now has properties yielding $5,000,000 a year, Hughes said, "and it is too bad for the revenue there are not more such men because these properties must be worth $25,000,000, and when he dies the federal estate tax thereon at present rates will be about $16,600,000, and also if he now has income from the property of $5,000,000 a year he pays an annual income tax of 77 per cent on half his income, or almost $2,000,000."

If "Mr. X" hadn't drilled for oil the Treasury would have collected only about $4,000,000 in income tax for the 5 years, so in the long run the Government stands to win, rather than lose.

Buttered Joker

Business concerns that like to play tag with the Federal Trade Commission are going to find their pleasure more expensive in the future. In fact, it may cost them anywhere up to $5,000 a day to ignore an FTC cease-and-desist order after it becomes effective by court decision or otherwise.

Heretofore, the penalty for violating an FTC order was a fine of up to $5,000 for each violation, and a violation might and frequently did extend over a period of months. More than that, the courts usually imposed fines of only from $50 to $1,000 when they did catch up with violators. Only once in the past 12 years has an offender been fined the maximum.

Now, thanks to the "butter bloc" in Congress, each day of a violation will be considered a separate offense. While the penalty provision was directly designed to aid the commission in regulating the advertising of oleomargarine, it is applicable to all FTC orders, including any that may be issued against the oil industry.

The new penalty got into the law by one of those peculiar quirks of strategy for which Congress is famous. Fighting a bill which would remove the special taxes on oleomargarine and thus increase competition with their product, the butter interests attempted to load the measure with provisions they thought Congress would not stand for, among them the increase in the cost of giving the Government the run-around. Much to their surprise and disgust neither the oleo interests nor anybody else put up much of a fight against the proposal, which was still in the bill when it went to the President for approval.

After ERP—What?

With oil one of the most complicated problems of ERP, the question already is being asked what will happen when the program ends.

Economic Cooperation Administrator Paul G. Hoffman is confident that the dollar gap of the Marshall-plan nations can be reduced to managable proportions by midyear 1952, but the problem of keeping it there after the present props are knocked out is a matter of increasing concern to the administration, which must come up with some plan next year so as to give Europe time to adjust itself to new conditions.

The most effective expedient, at the moment, appears to be manipulation of our own international trade so that we export less to Europe and take more from it, possibly as much as a billion dollars a year more of European goods.

Several European countries are expected to have their exchange situation under control when the Marshall plan terminates. Others will be in varying states of difficulty, and the sterling area, by and large, will probably be the worst off of all.

With a dollar gap still confronting it, and with a determination to balance dollar imports and exports, Britain is seen as going all out to build up its trade with the dollar area. Its most saleable and most abundant commodity for that purpose is oil, which leads up to the question: After ERP—What? particularly with respect to dollar oil.

world—"one reflection of our willingness to practice what we preach."

Any reduction in imports would bear directly on our relations with foreign oil-producing countries and would mean in all likelihood the curtailment of production and, therefore, a reduction in the income of those countries affected.

British ban.—The gravest danger to our companies abroad, however, lies in the British plan to supplant dollar with sterling oil, Blaisdell indicated. He did not go further into the present negotiations over that plan than to outline the broad issue, since it is a subject on which only the State Department can speak with authority.

But he did tell the subcommittee that "so peculiar is the world petroleum industry that steps taken by the British in pursuit of this objective (of reducing the dollar drain on oil) also infringe to varying degrees upon the various interests of the United States.

"If present indications materialize, United States companies will suffer a substantial loss of market outlets for their oil products. This in turn will affect United States concessions abroad, since without adequate markets United States companies will be compelled to reduce crude-oil production. This reduction will affect the income of, and may prejudice the companies' relations with, the governments of the countries in which their concessions are located. I refer to the operations in countries such as Venezuela or Saudi Arabia. The economic damage to friendly foreign powers or the loss of some of these concessions would affect the national security or other interests of the United States."

Future uncertain.—Explaining that the importing companies' plans for the future have been disclosed only for the first half of this year, Blaisdell admitted that the impact of future imports may be heavier than that heretofore experienced, and said the problem of sizable imports will be further complicated as the result of the discovery of large deposits in western Canada.

"This involved problem of imports will be with us for some time, not only for reasons already indicated but primarily because of the growth of demand in the United States," he said. "It seems highly probable that in meeting this demand we should take advantage of low-cost foreign oil and conserve our national supplies and that this should be done in such a manner as to maintain the oil industry with sufficient return to keep production and reserves at the necessary high levels."

Outlining the manner in which imports could be curbed, Blaisdell said quantitative restrictions (quotas) will do it "very effectively" and there are other approaches, such as making im-

ports more expensive through high tariffs. The latter, he said, would be preferable from the standpoint of industry and "if I were given a choice of type of control I would choose the one which seems to me the least offensive to private industry, which would be the tariff."

Under questioning by Chairman Oren Harris of Arkansas, who has introduced a bill relating to national oil policy, Blaisdell said that an overall government energy policy would be advantageous, but was forced to agree with Harris that it might carry with it connotations of controls on the oil and other fuel industries.

But Blaisdell contended such controls need go no further than those now exercised by the Federal Power Commission, although a "broad understanding" of the relationships between various fuels would be required.

Action Promised

U. S. planning strong move against British oil ban

WASHINGTON.—State Department officials hope to complete a strong counterproposal to the British order substituting sterling for dollar oil by the end of this week.

Representatives of the companies involved have been called in for another discussion of the situation on March 17, at which time they will be told what constitutes the "platform" on which the department hopes to obtain amelioration of the British order.

Department officials would like to bring their negotiations with the British to a definite conclusion before Congress acts on extension of the Marshall plan, in view of the intention of Chairman Tom Connally of the Senate foreign relations committee to offer an amendment to the measure intended to prohibit discriminations against American business by the Marshall-plan countries.

Connally's amendment would require each nation receiving Marshall-plan aid to enter into a bilateral agreement with the United States to prevent such discrimination.

It is the contention of the State Department that the British oil order is based on more than a desire to save dollar exchange and is motivated, in part at least, by a desire to expand the market for British oil.

One ground for this position is the extension of British oil operations in Venezuela, where the dollar component of oil is estimated to run in excess of 60 per cent, while at the same time no effort has been made to expand operations at Abadan, where the dollar content is only 20 per cent.

As soon as the department's counterproposal is completed it will be submitted to the British Government, where, it is hoped, it will serve at least as a basis for further discussions. So far, the British have not receded from their original position in any respect that would help the American companies whose products are being displaced.

Retaliation Asked

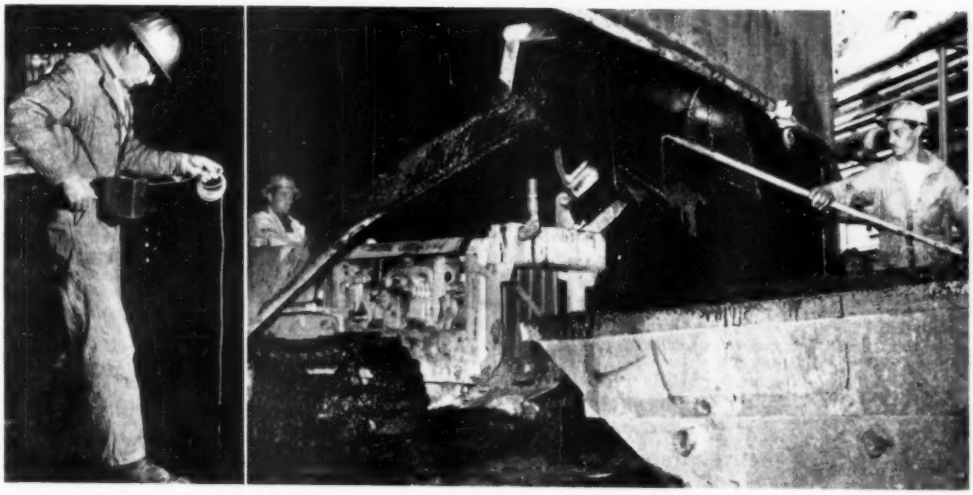
British oil would be barred from U. S. by Monroney bill

WASHINGTON.—Rep. A. S. Mike Monroney of Oklahoma proposed last week that the British be given a dose of their own medicine, introducing a bill in Congress which would authorize the President to ban imports into this country by British-controlled oil companies in reprisal for British bars on imports of dollar oil into the United Kingdom.

Outlining the dollar-sterling oil controversy, Monroney told the House it is likely that the negotiations of the State Department to protect the interests of the American companies will fail, largely because under present law the United States lacks the power to take effective action if the British refuse to modify their position.

"The only effective way of meeting discrimination against American investments is by treatment in kind," he said. "Our customs laws have embodied this principle for many years.

"It is my earnest hope that the power granted by my proposed amendment would never have to be used. . . . Unfortunately, unrestricted world trade is going to be difficult to achieve so long as foreign nations are free to discriminate against American commerce without fear of any retaliation of any kind."



SAFE CLEANING.—As one of many safety precautions taken in cleaning large crude-oil storage tanks, the gas tester in the left picture is making one of his frequent checks during cleaning operations. The tank, which is located on a Humble Pipe Line Co. farm, had been steamed earlier and declared safe. With a bottom plate unbolted, a scoop-equipped tractor removes most of the basic sediment from the tank, as shown in the other picture. Men with shovels finish the job.

R. L. Foree, Dallas, new president of the Texas Independent Producers and Royalty Owners Association, center, with Jack Porter, first president of the association, left, and Guy I. Warren, Corpus Christi, outgoing president.

Texas' Curtailment

T.I.P.R.O. hits other southwestern states for making Texas absorb reduction in crude demand; blasts imports

Carl F. Hoot

DALLAS,—Texas is doing far more than its share in coping with conditions brought about by increased imports and a leveling-off in domestic demand for petroleum, Maston Nixon, president of Southern Minerals Corp., Corpus Christi, told those in attendance here March 9 at the fourth annual meeting of the Texas Producers and Royalty Owners Association.

Nixon, who has been active in the work of the association since its formation, presented data showing that if other states of the Southwest would do their part the Texas allowable could be increased approximately 250,000 bbl. daily at this time.

Business sessions at the annual meeting were attended by approximately 100 active members with a large banquet in the evening at the Baker Hotel. Railroad Commissioners William Murray and Olin Culberson were guests of the association. Present membership, it was explained, now totals about 3,400 producers and royalty owners, including a large number of other business interests located in the oil country. Plans were announced to increase this membership to over 5,000 this year.

Other states criticized. — Nixon was particularly critical of Louisiana, where, he said, the only reduction in output had been brought about by the refusal of some buyers to take more crude. He also contended that large quantities of crude have been brought into Texas from other states.

Figures on the production situation in six southwestern states, shown in the accompanying table, were presented by Nixon to prove his charge of injustice. These figures showed that while Texas has 74 per cent of the reserves of the six states, its production is but 56 per cent of the total. During the past year, Texas has curtailed output 17.4 per cent whereas Louisiana has increased 8 per cent, Kansas 4 per cent, and Oklahoma 2 per cent.

Nixon said an investigation should be made to show what purchasing companies were discriminating against Texas. He cited instances in which certain companies had restricted their taking of Texas crude but had made no change in their purchases from other states.

In connection with this discussion the membership voted to authorize the appointment of a committee which will make a study of the merits of pipe-line divorcement in relation to the problems of the independent producers.

The following resolutions were adopted:

Kerr bill. — Members were asked to support the Kerr bill, now pending in the Senate of the United States, to amend the Natural Gas Act to exclude production and gathering of natural gas from jurisdiction of the Federal Power Commission. Passage of the bill was deemed necessary to the preservation of an expanding natural-gas industry in the United States, and to the preservation of legislative role from surrender to administrative bureaus and agencies.

Imports. — The resolution on imports condemned unfair discrimination against Texas crude oil, the induced burden not being fairly distributed among the six principal states of the Southwest, namely, Texas, Louisiana, Oklahoma, Kansas, New Mexico, and Arkansas.

The association resolved that as representative producers it should take immediate steps to correct this injustice by developing factual data showing in detail purchases of major buyers, and making such information public by inserting it into the record of monthly proration hearings of the Texas Railroad Commission.

It was further resolved that Congress be petitioned to take emergency steps to stop unfair competition by restricting the amounts of oil which can be imported into the United States; and to halt the giving of American taxpayers' money to for-

SOUTHWESTERN PRODUCTION

	Reserves Jan. 1, 1950 (thousand bbl.)	Per cent	Production Feb. 25, 1950 (bbl.)	Per cent of production
Texas	14,687,000	74.5	1,916,500	56.6
Louisiana	2,252,000	11.4	545,900	16.1
Oklahoma	1,226,000	6.2	425,050	12.6
Kansas	673,000	3.4	287,600	8.5
New Mexico	566,000	2.9	130,800	3.9
Arkansas	301,000	1.6	80,300	2.3
Total	19,705,000	100.0	3,386,150	100.0

Daily Average Production

	Feb. 26, 1949 (bbl.)	Feb. 25, 1950 (bbl.)	Change (bbl.)	Per cent
Texas	2,320,950	1,916,500	—404,450	—17.4
Louisiana	505,850	545,900	+ 40,050	+ 8.0
Oklahoma	416,650	425,050	+ 8,400	+ 2.0
Kansas	276,550	287,600	+ 11,050	+ 4.0
New Mexico	134,350	130,800	— 3,550	— 2.6
Arkansas	82,450	80,300	— 2,150	— 2.6
Total	3,736,700	3,386,150	350,550	

eign governments to compete with our own American wage-paying and tax-paying industry.

The resolution also pointed out that foreign oil enjoyed a further advantage over domestic production in that much of it is being carried in tankers built by American capital, but registered in other countries in order that transportation costs to this country be less than would be the case if American wages and conditions were observed.

The association expressed thanks to Congress' committee on small business, for the fair, full, and complete investigation it has made of the import situation.

Depletion allowance.—Also approved was a resolution commending efforts of the Texas delegation toward providing Congress with facts "demonstrating beyond any doubt the full justification for continuance of the depletion allowance in its present form."

It was pointed out that where normal business enterprise is afforded a depreciation deduction enabling the repairs and eventual replacement of property without depletion of capital assets, the production of oil and gas represents a depletion of capital assets represented by oil or gas in place, for which a depletion allowance must be made, unless producers and royalty owners are to have their property assets confiscated through taxation.

The Texas Railroad Commission was lauded in its work, and it was resolved to request the commission to steadily increase Texas crude-oil allowables "at a rate that will recapture these lost markets for Texas crude oil."

New officers.—R. L. Foree of Dallas, independent operator since 1921, was the unanimous choice of the group to head the association as president, succeeding Guy I. Warren of Corpus Christi. E. I. Thompson, Houston, a founding officer of T.I.P.R.O., was reelected executive vice president. Vernon W. Frost, Houston, succeeded A. R. McElreath of Fort Worth as secretary, and William T. Beard, Jr., San Antonio, was reelected treasurer.

Texas' Gas Utilization

Railroad Commission's report shows that casing-head gas is now a major source of supply for processing plants

Leigh S. McCaslin, Jr.

HOUSTON.—More than one-fourth of all natural gas produced in Texas during 1949 was utilized for secondary-recovery and lifting operations—recycling, repressuring, pressure maintenance, and gas lift.

This was revealed in the annual gas report of the Texas Railroad Commission released this week. Utilization of all gas in the state, based on reports to the commission, is shown in the accompanying Table 1.

A number of other statistics in the annual report of the commission's Gas Division reveal the progress made in gas conservation. The report shows that 52 new plants were built for processing gas for the extraction of liquid hydrocarbons. In addition, nine new pressure-maintenance for repressuring plants were placed into operation during the year.

Casing-head gas, a commodity which has been widely flared in past years, constituted a major supply source for the gas processing plants. Thirty-two per cent of the intake gas of the state's gasoline plants was casing-head gas. The figure was even higher for pressure-maintenance and repressuring plants which received 54 per cent of their intake gas from this source.

Flaring not reported.—Gas-well gas accounted for 77.85 per cent of the state's total gas production of slightly over 3.5 trillion cubic feet. The remaining 22.15 per cent was casing-head gas. The state's figures do not include legally flared casing-head gas which is not required to be reported. All gas volumes are computed at a standard pressure base of 14.65 psi., and flowing temperature of 60° F.

A detailed breakdown of the disposition of the casing-head gas reveals that 71.88 per cent was utilized by gasoline plants (see Table 2). Second largest volume of this type of gas was used by pressure maintenance and repressuring plants which accounted for nearly 10 per cent of the total.

The only dark spot in the gas report was the section dealing with carbon-black-plant operations. Gas used for carbon-black manufacture dropped from 30.9 billion cubic feet at the beginning of the year to 26.3 billion cubic feet for the month of December. Also, carbon black in storage more than doubled during the year in jumping from 62,539,464 lb. in January to 141,343,394 lb. in December. Plants in the state were producing only 58,429,973 lb. monthly in December as compared with 63,689,200 lb. in January.

Other statistics.—Those engaged in the transmission of Texas gas out of the state could obtain some interesting statistics from the report. As mentioned earlier, roughly one-third of the gas entering gasoline plants is casing-head or flare gas. Of the residue gas, 58 per cent is delivered to transmission lines (both interstate and intrastate). Hence, a simple calculation shows that nearly one-fifth of the gas which the transmission lines receive from gasoline plants is casing-head gas. So, it could be argued that the lines are providing a much-needed market for flare gas. The gasoline plants are, incidentally, the biggest suppliers of transmission-line gas—furnishing 60 per cent of the total line input in 1949.

In addition to utilizing casing-head gas, via gasoline plants, the transmission lines take a large amount of this gas direct from the wells. Table 2 shows that 8.21 per cent of all casing-head gas produced last year entered directly into transmission lines. Transmission lines supplied a large market for gas-well gas also, but not so large as recycling and gasoline plants (see Table 3).

Production of liquid hydrocarbons from natural gas, following a nation-wide trend, was on the upgrade during the year. Monthly production of gasoline plants rose 16.8 per cent with output at 6,055,695 bbl. at year's end as compared with 5,182,890 bbl. in January. Recycling-plant output was up 13 per cent at the end of the year with a monthly production of 2,076,504 bbl.

TABLE 1—ULTIMATE DISPOSITION OF ALL GAS, 1949

	M.c.f.	Per cent
Extraction-loss plants	120,224,268	3.41
Plant fuel-lease use	299,418,016	8.51
Gas lift	124,573,879	3.54
Press. maint.-repress.	245,170,185	6.97
Recycling plants	552,841,249	15.71
Carbon-black plants	330,184,594	9.38
Transmission lines	1,804,852,205	51.29
Line losses and venting	41,909,355	1.19
Total	3,519,173,751	

TABLE 2—CASING-HEAD GAS PRODUCTION AND DISPOSITION, 1949

(Monthly average of 65,631 wells reported)

	M.c.f.	Per cent
Fuel system-lease use	28,377,409	3.69
Gas lift	8,162,237	1.07
Press. maint.-repress.	74,906,171	9.72
Transmission lines	63,201,023	8.21
Recycling plants	29,219,480	3.80
Gasoline plants	554,472,878	71.88
Carbon-black plants	7,349,299	0.96
Vented and line loss	5,143,551	0.67
Total	760,832,048	

TABLE 3—GAS-WELL GAS PRODUCTION AND DISPOSITION, 1949

(Monthly average of 6,164 wells reported)

	M.c.f.	Per cent
Fuel system-lease use	60,569,982	2.21
Gas lift	69,102,581	2.52
Press. maint.-repress.	22,646,226	0.83
Transmission lines	629,260,742	23.00
Recycling plants	728,072,866	26.57
Gasoline plants	1,219,227,949	44.47
Carbon-black plants	11,344,799	0.40
Vented, line loss, meter diff.	—434,545	
Total	2,739,790,600	

A.P.I. Fights Statism

Public education on oil's accomplishments and reserves called best way to protect industry's position

Roy F. Carlson

DALLAS.—The governmental trend toward statism was flailed again at a meeting here last week of the southwestern district of the American Petroleum Institute, Division of Production.

More than 400 people registered for the 3-day meeting that was addressed during the opening session by Dr. D. M. Wiggins, Texas Technological College president. Dr. Wiggins pointed to the petroleum industry as an example of what individual initiative can do.

"The phenomenal development of the liquid fuels industry has not been accidental," he said. "Powerful motivation has been given by engineers who possessed a scientific 'know-how'. In no industrial development has individual initiative received greater emphasis."

He said that proposals to reduce the depletion allowance are "far beyond a mere question of taxation," and that if adopted these proposals would remove the incentive and ability of the individual to assume the risks which must be taken in the search for oil.

O.I.I.C. — G. L. Tate, vice president, Magnolia Petroleum Co., beat the drums for the Oil Industry Information Committee, calling education of the American people as the best method of stopping government control of the oil industry.

Of the A.P.I.'s public-relations program Tate said, "It means an opportunity for every man in the oil business to strike a blow for his own job security, to hit a lick in his own defense, to give a little of his own energy and effort to the job of making sure there continues to be an oil industry as he has known it, in which he can prosper and make a living as a free American."

Tate advised teaching the facts about the oil industry to all in the industry first, so that they can then further this teaching among the other members of their communities. Of the teaching of people in the oil business he said, "we believe we have made a promising beginning in the right direction." He suggested now a concerted campaign on the part of all oil men to bring the facts to the general public.

It is America's 2,000,000 oil men, he said, who can best inform the public and forestall forces that "support some form of regimented, government-controlled collectivism for all businesses and business men."

"Reserves". — Dr. Frederic H. Lahee, geological and research counselor for Sun Oil Co., criticized usage of the term "reserves."

"There has been a tendency," he said, "among many of those people who bemoan the diminishing ultimate supply of oil reserves to divide the estimated reserves as of the end of a given year by the quantity of oil produced in that year, and to state that the quotient represents the number of years left during which we may expect to be able to benefit by our domestic supply."

He showed that this quotient has for the past 12 years fluctuated near an average of 13, and had the same value, 12.2 for the years 1937 and 1948, despite the production between those years of several billion barrels of oil.

Dr. Lahee suggested that those people "who are inclined to play with figures or estimates of the oil and gas reserves of the country" should be made to understand that, for the oil described as proven reserves, a great many more years will be required for its recovery than given by the quotient above, and that at any one time, and for many years to come, there are great quantities of oil yet to be discovered which may subsequently become "proven reserves."

Lahee further emphasized that when anyone makes mention of reserves he should clearly define them by use of terms like drilled-proved, undrilled-proved, and hypothetical.

Rock bit drilling rates. — "Hydraulic factors" definitely affect drilling rates, and one help for faster drilling time is increased rate of circulation of drilling fluid. Another aid is high fluid-velocity nozzles in the bits. These conclusions were given by petroleum engineers W. J. Bielstein and George E. Cannon, Humble Oil & Refining Co., Houston, in a significant paper on the subject.

Gas-oil ratio repair.—Forty-nine per cent of all gas-oil ratio repair work in 24 fields in West Texas and New Mexico are successful. This is based on 503 repair jobs costing an average of $3,570 per job. However, 36 per cent more jobs were partially successful and only 15 per cent were failures. These data and supporting detail as to repair-method costs and other information, were presented by T. D. Lambert and R. M. Hippard, Shell Oil Co., Inc., of Odessa, Tex., and Hobbs, N. M., respectively.

Three of the new officers of the southwestern district of the Division of Production of the American Petroleum Institute: E. C. Patton, Jr., Magnolia Petroleum Co., Dallas, secretary-treasurer; Harold Denton, Sun Oil Co., Beaumont, chairman; and Olin G. Bell, Humble Oil & Refining Co., vice chairman for Texas Gulf Coast area.

New Reef Area?

Wildcat finds Canyon reef in middle of Kent County

THE productive area of reef oil apparently was extended a distance of 17 miles into the very center of Kent County, Texas, this week by a wildcat drilled by Hunt Trustee Estate, Dallas.

The well, the 1 J. W. Young, topped the Canyon reef at 4,116 ft. below sea level. In the Scurry County fields to the south, the oil-water table of the Canyon reef formation is considered to be approximately —4,500 ft. If this holds true in Kent, the Hunt wildcat would have some 384 ft. of oil saturation column.

The Kent County prospective pool opener took two cores in the reef, and while the recovery was poor, the core samples obtained were oil-stained and bleeding, with porosity.

The well now is drilling ahead at 6,500 ft.

Canyon-reef oil production already has been substantially indicated along the southern border of Kent County in Cogdell field just over the northern Scurry line. It is 17 miles straight north from the Scurry-Kent line to the Hunt discovery, which is located 467 ft. from south and 1,640 ft. from east lines, 166-G-W&NW Survey. The Hunt well is on acreage farmed out by General Crude Oil Co., Houston.

There are now over a half-dozen widely scattered wildcat wells in Kent County that are looking for new Canyon reef fields. If some of these find oil the huge spread of Kent County acreage opened for future development may rival the one billion barrels of new crude reserves that have been opened up in Scurry County over the past year.

(For further information on "Kent County wildcats," see the Journal's field reports under the Permian Basin section, page 141).

Scurry Study

Engineering group plans schedule for pressure tests

MIDLAND.—The huge spread of oil territory represented in the new Canyon reef fields of Scurry County now has a formalized inter-operator engineering committee.

W. L. HORNER

At a meeting in Midland, March 9, representatives of 35 operators approved the articles of the engineering committee's organization. Five others have signified approval with minor changes. Committee work for the big reef fields will be to collect factual data on oil, gas, and water production, to schedule tests and analyze data on bottom-hole pressures and gas-oil ratios, and to scrutinize reservoir pressure performance, pressure-maintenance possibilities, electric log correlations, and core-analysis records.

General chairman of the Scurry committee is W. L. Horner, Barnsdall Oil Co., Tulsa; vice chairman is James Reed, Lion Oil Co., Snyder; secretary-treasurer, J. L. Lawton, Standard Oil Co. of Texas, Midland. In the organization's framework also are the operators' advisory committee, headed by Ralph H. McCullough of J. S. Abercrombie Co., Houston; and field advisory committee, with Robert Fitting, consulting engineer, Midland, as temporary chairman.

The Scurry reef engineering committee started functioning the first day after its organization. After study of field and reservoir records, it recommended a 96-hour shutdown period be taken by each well before bottom-hole pressure tests are commenced, and that all bottom-hole pressure data be calculated to a datum level of —4,300 ft. Texas Railroad Commission has ordered a field-wide shutdown of production in the Scurry reef area March 18-26 for BHP tests.

Offices of the new Scurry engineering committee will be at Midland. The organization will employ a qualified petroleum engineer to handle its Midland offices, in fashion similar to several other "pool engineer" organizations functioning in Texas and other states.

GULF COAST

Tidelands Try

Cut in states' take of oil revenues may speed bill

WASHINGTON.—The House judiciary committee is scheduled to take up the Gossett tidelands bill this week, with the Texas representative prepared to urge that the states' take of revenues from operations on the Continental Shelf be reduced from the 50 per cent provided in the measure to 37½ per cent, the share they now receive from oil operations on the public lands.

The lowering of the states' demand for revenues from the submerged areas which are to remain in federal hands is expected to gain support for the legislation from members who have been on the fence because of the administration's resistance to taking the states in as equal partners.

If the judiciary committee sends the bill along to the floor of the House it is seen as having a fair chance of passage. But it is considered probable that, for political reasons, administration leaders will not permit it to be brought up in the Senate this year, aiming to save the President from the responsibility of vetoing legislation which is popular in California where an all-out effort will be made by the Democrats next November to take control away from the Republicans.

The Gossett bill would restore to the states their title to the tidelands for a distance seaward of 3 miles from low-water mark except in Texas, where a 10½-mile limit would be provided, and would give the states police power out to the uttermost edge of the Continental Shelf, ownership of which would be acknowledged to lie with the federal Government.

NEXT WEEK

Annual Refining Number

For many years the Journal's Annual Refining Number has been the outstanding publication of the year, serving those who build and operate refineries in this and other countries. The 1950 number of March 23 will be the most complete and comprehensive ever presented. It will include:

A 40-page process section compiled with the aid of refining organizations and engineering and construction firms. This well-illustrated section will bring up to date the latest information on 39 leading processes.

Feature articles by widely known technologists of the refining industry describing the latest developments in all phases of refinery processes prepared exclusively for this issue. Here are a few of the subjects: Furfural Refining of Gas Oils—Filtration of Refining Emulsions and Separator Sediment—Application of Vacuum Distillation and Visbreaking in Modern Refining—Maintenance of Fluid Catalytic Cracking Units—Fluid Catalytic Cracking of High-Sulfur Stocks With Natural Catalyst—Propylene Polymerization for Motor-Gasoline Production.

Another feature will be the economic analysis based on surveys conducted by the Journal's refinery engineering and statistical staff. This feature of the issue will include the Journal's annual survey of petroleum-refinery operations in North America by plants, giving detailed information on capacities and types of operation. Discussions based on these surveys and other current data clearly reveal future trends in petroleum refining, as well as the scope of present-day activities.

ALONG THE GULF

Leigh S. McCaslin, Jr.

Proration Problems

HOUSTON. — Many Texas oil operators are going to be dissatisfied by the state's proration system, no matter what changes may result from the monthly hearing of the Railroad Commission in Fort Worth this week.

It was expected that various operators would propose several alternatives to the oil-proration formula which went into effect March 1, but to date no one has come up with a method which would be satisfactory to everybody.

The new formula, which is based on acreage and depth, has had the effect of raising production in near-stripper or low-producing fields while cutting production in flush fields. East Texas field producers were favored by the new system, while Gulf Coast and West Texas operators took the brunt of the cuts.

Here in Houston, there seem to be two major problems as a result of the new formula: (1) Some companies do not have enough crude to meet their requirements, and (2) some companies do not have the right kind of crude for their refining needs. Refining and crude-oil purchasing departments have been poring over these problems in detail since the new system was announced by the Railroad Commission.

At least one major company is experiencing a lack of sufficient crude to operate at desired levels. Apparently a large part of the company's production was coming from the Gulf Coast and West Texas fields which had large production slashes. (Examples: Thompson field down from 19,883 bbl. daily to 7,172; Webster field down from 29,538 to 10,054; Scurry County fields down from 49,860 to 28,887.)

Three large integrated companies are believed to be suffering from a shortage of low-cold-test crude. These companies have refineries in the Texas Gulf Coast area and use this type of crude to produce their lube stocks. Fields which supply Gulf Coast refiners a large portion of their needs of low-cold-test crude are Thompson, Hastings, Webster, Sugarland, Magnet-Withers, and Barbers Hill.

The production of all of these fields was hard hit by the new formula. Hence, the refiners must either have part of this lost production restored or adjust their refinery operations to fit other types of crude.

Because of these two major difficulties, it is expected that several new formulas will be proposed to the Railroad Commission. One that has been the subject of considerable discussion involves a revival of use of most efficient rates of production. It would give 50 per cent weight to a field's MER, and 50 per cent to depth and acreage as set forth in the new formula.

It was not expected that many producers will ask for increases in the state's over-all allowable. The major effort is directed towards a redistribution of production rather than an increase.

Big Rig

A new diesel-electric drilling rig, which may be the world's largest, is reported to be nearing completion. Current holder of the title "world's largest" is Penrod Drilling Co.'s Rig 44 which at present is making hole in South Louisiana. *(See The Oil and Gas Journal, March 9, 1950, page 68, for details on this big rig.)* Penrod's rig generates a total of 1,800 kw., with 1,500 kw. used for drilling and 300 for auxiliary purposes. The rig now under construction will surpass these figures.

There has been a very noticeable trend in the Gulf Coast area over the past few years toward power rigs—that is, away from steam rigs. The increasing cost of natural gas is the prime factor behind this switch. At one currently drilling well in South Louisiana, the operators of a large steam rig are paying 14 cents per M.c.f. for gas—a very high price.

Tidelands Rumors

A number of rumors have been flying around in recent weeks concerning a possible quick compromise settlement of the tidelands fight. High-placed oil men discount these rumors, however. Most seem to feel that the over-all situation, as far as the oil industry is concerned, is no better than a year ago. In fact, some are a little more pessimistic about it.

Some interpreted Louisiana's offering of offshore leases at the coming March 30 sale as an indication of quick settlement. Others feel that this action has jeopardized the state's fight with the federal Government.

WEST COAST

Refinery Revamping

SOCal begins big project to cut heavy-fuel yields

LOS ANGELES.—A multimillion-dollar construction program, designed primarily to aid in reducing the present overproduction of heavy fuel oil in California has been announced by T. S. Petersen, president of Standard Oil Co. of California.

The company's announcement explains that the changes to be made in its processing equipment will enable the company to increase its production of gasoline and intermediate products for which there is a growing demand in its market territory, and at the same time decrease its yields of residual fuel, the demand for which has declined. Expansion of natural gas sales in California and the shift of western railroads from residual fuel to diesel fuel are primarily responsible for the decline in the consumption of low-gravity fuel.

At Richmond (San Francisco Bay area) where the Standard company operates a refinery with a crude-oil capacity of 138,000 bbl. daily, its T.C.C. catalytic cracking unit will be converted to the new Houdriflow process. This unit, one of the largest of its type ever built, has a capacity of 32,500 bbl. daily. Converting the process to the new-type operation will increase its coke-burning capacity 60 per cent by enabling it to handle 500 tons of catalyst hourly. At present the capacity is 150 tons hourly.

At the Richmond refinery, a new vacuum tower capable of handling 50,000 bbl. of charging stock daily will be installed. The new tower will have a diameter of 26 ft., and will be used in a vacuum distillation operation which will process heavy-oil residue of other refining processes.

Changes will be made at other refineries so that their operations can be integrated into the new processing program which has been approved by the company. Engineering work has started on the T.C.C. plant conversion and the entire project is scheduled for completion by the summer of 1951.

Other operations at the Richmond refinery include 56,000 bbl. daily of thermal cracking capacity and an alkylation plant production of 2,700 bbl. daily. The refinery has facilities to produce 9,000 bbl. daily of lubricating oils.

At Bakersfield, Calif., the company operates a 17,000-bbl. refinery with a thermal cracking capacity of 8,000 bbl. daily. At El Segundo, the company refinery has a capacity of 117,000 bbl. daily with a thermal cracking capacity of 69,000 bbl. daily. The alkylate production at this refinery is 4,250 bbl. daily.

Sinclair's Pensions

New details of retirement and sick-benefit agreement with O.I.W.U. show it to be most liberal in industry

Dahl M. Duff

NEW YORK.—The recent "package" offer made by the Sinclair companies to the Oil Workers International Union for liberalized retirement and welfare benefits contains several provisions which are the first of their kind either in oil or the industrial labor field generally.

The tentative agreement between the union and Sinclair Refining Co. and Sinclair Oil & Gas Co. provides for a minimum retirement annuity of $125 a month to participating employes reaching the age of 65 who have 20 years or more of service.

This minimum annuity includes primary Social Security benefits, and one of the conditions of the company's offer is the enactment of H.R. 6000. This measure is now pending in Congress and would increase Social Security benefits by some 70 per cent.

Several other features of the retirement program would be liberalized. Eligibility requirements are reduced, and employes would be vested with more than half their annuities after 10 years' service, even though leaving the company.

The second section of the Sinclair offer provides a broad schedule of sickness, medical and hospitalization accident benefits. These include a higher sickness and injury pay schedule, additional accident insurance, and hospital and surgical benefits.

Union concession.—If the offer goes through, the union on its part has agreed to a 1-year extension to June 30, 1951, of its company-wide contract with Sinclair with no changes in wages during the period. In addition, the terms of the retirement plan are frozen for 5 years, and those of the welfare benefit plan are frozen for 2 years.

Besides being conditioned on enactment into law of H.R. 6000 on or about July 1, 1950, the entire proposal must be ratified by the union membership and approved by the Sinclair stockholders at their annual meeting in May.

The Sinclair - O.W.I.U. agreement has aroused widespread interest as a possible forerunner of other contracts of this type. The $125 monthly retirement minimum is $25 greater than that in coal or steel and represents one of the current goals of the C.I.O. A labor paper has referred to the Sinclair agreement as "the C.I.O.'s latest and best."

Climax of series.—For Sinclair, the agreement is the most recent of a series of precedent - setting arrangements with the oil workers' union. For 16 years, Sinclair has had the only company-wide national contract with the O.W.I.U. On two occasions since the war, its wage settlements with the union were virtually the first in the industry. In 1946 Sinclair and the O.W.I.U. worked out a plan of tying wage changes to the Bureau of Labor Statistics living-cost index. This was abandoned by mutual agreement a year later.

The existing labor agreement between the Sinclair companies and the O.W.I.U. was negotiated last spring to run for a year from July 1, 1949. At the time it was agreed that further negotiations would be held on retirement and employe benefits. From these the company's "package" offer resulted.

The Sinclair organization has had a retirement pension plan in effect for a number of years, though not included as part of the over-all labor agreement. This existing retirement plan provides for employe contributions according to salary with, for example, the employe in the $4,200-$4,600 annual salary bracket paying $8 a month.

The Sinclair offer brings this retirement plan under the general labor agreement with the important provision that there is no change in the amount of employe contributions. Eligibility would be liberalized to 5 years' service at age 25 or 1 year's service at age 35.

Social Security integrated.—In addition to the $125 minimum, including primary Social Security benefits, to participating employes reaching 65 with 20 years or more service, proportionately reduced annuities, including primary Social Security, would be provided for employes reaching 65 with between 15 and 20 years' service.

It is generally expected that the Senate will act favorably on H.R. 6000. It has already been approved by the House. These increased Social Security benefits would provide about $68 of the $125 monthly pension in the case of an employe covered.

The agreement specifies that the complete and continued integration of the primary Social Security benefits with the annuity benefits as provided under the amended plan will apply only insofar as the minimum benefit may be applicable. This means there will be no reduction of higher retirement benefits.

After 10 years of service, 50 per cent of past and future benefits are vested in the employe, regardless of whether he continues with the company or not. This vested amount rises by 5 per cent a year to a maximum of 20 per cent after 20 years' service. Participants permanently and totally disabled after 15 years are vested with 100 per cent of their retirement rights.

Sickness benefits.—The existing general labor agreement provides a scale of sickness and injury pay up to a maximum of 5 weeks' full pay and 25 weeks' half pay for employes with 20 years or more service. Under the new agreement, sickness and injury pay is extended. In addition, a whole new set of medical, hospitalization, and insurance benefits would be provided for participating employes and dependents. Cost of these is partially met by an employe contribution.

The new plan on sickness and injury pay provides that an employe would continue to receive the basic period of full pay as provided in the labor agreement. The succeeding half-pay period would be replaced by from 58 to 62 per cent of full pay up to an entire period of 52 weeks.

Participating employes are given occupational and nonoccupational accident death or dismemberment insurance in the flat amount of $1,000. For hospital expenses, a participating employe receives $8 a day and a dependent $6 a day for a period of 70 days. Special hospital charges are met by an allowance equal to 10 times the daily hospital expense benefit.

For surgical expenses, participating employes get from $5 to $225, and dependents from $5 to $180, depending on the nature of the operation. For physicians, a supplementary hospital benefit for both participating employes and dependents is provided at the rate of $3 a day up during hospital confinement up to a maximum of $93. Maternity benefits for participating employes or dependent wives range from $50 to $150.

Employes contribute.—The contribution paid by the employe for the welfare benefits varies according to wage bracket. For example, employes making between $4,000 and $7,500 a year pay $2.15 a month for the employe alone, $3.75 for employe with children only, and $4.25 for employe with wife only or wife and children.

The new agreement is applicable to about 20,400 Sinclair employes in all branches of the company's activities, with a few minor exceptions. The union has a membership of 10,000 in Sinclair but the benefits provided in the company-union agreement are made applicable to all.

Commenting on the Sinclair offer,

O. A. Knight, president of the O.W.-I.U., said it represented the best terms obtained by the union to date. The vesting and eligibility clauses in the retirement plan were features that Knight considered particularly good.

Knight praised Sinclair's labor-relations policies and program. He said working under the company-wide contract had been very satisfactory from the union's standpoint. He added that the union is now negotiating with several other companies in the oil industry for pension and welfare benefits.

Ratification of the agreement by the union is expected to be completed this week. Favorable action by the stockholders of the company is anticipated.

More Steel for Oil

NEW YORK.—The oil and gas industry received a record high tonnage of steel in 1949, according to the American Iron and Steel Institute.

Preliminary figures of the institute show that oil and gas users took nearly 4,500,000 tons of steel last year compared to about 4,300,000 tons in 1948. Included is steel for drilling, pipe lines, refineries, and other similar industry uses.

The oil and gas industry's steel shipments in 1949 represented 7.7 per cent of the country's entire steel production. This compares to 6.5 per cent in 1948.

While the oil and gas, automotive, and farm-equipment industries received record amounts of steel, total shipments declined as a result of the strike last fall in the industry, the institute said. Total shipments last year were 58,104,000 tons, nearly 7,870,000 tons below 1948.

Trends in Fuel Prices

WASHINGTON. — The prices of coal and oil have increased steadily since the beginning of the war but the price of natural gas to the consumer has remained comparatively stable, the Federal Power Commission told Congress last week in its annual report for the last fiscal year.

"Gas prices to the consumer since 1938 have actually declined while bituminous coal prices in 1947 had increased 60 per cent over the 1935-1939 base period; anthracite increased 61 per cent; and fuel oils increased 79 per cent," the commission reported. "This compares with a decrease of 9.6 per cent for natural gas during the same period."

The commission noted that legislation pending in Congress would exempt independent producers and gatherers of natural gas from FPC control, but did not comment on the measure although it has shifted its position from one of acquiescence to one of vigorous opposition.

Reserves Are Up

Annual joint A.P.I.-A.G.A. report shows proven reserves of crude, gas, and condensate all at record high levels

Charles J. Deegan

THE petroleum industry's raw material inventory in the form of proven reserves of crude oil, natural gas, and natural-gas liquids, increased to new all-time-high levels at the end of 1949, according to the joint reports of the reserves committees of the American Petroleum Institute and the American Gas Association.

The data, however, reflect the fact that supply has finally caught up with postwar demand. The inventory ratio of crude-oil reserves to withdrawals from the reservoirs went up to 13.55 from the previous year-end ratio of 11.63. It is not surprising therefore to find that the percentage increase in crude reserves was only 5.88 per cent during 1949 compared to 8.34 per cent in the previous year.

Natural-gas-liquid reserves were also at a new high, but here again the percentage rate of increase slowed

TABLE 1—U. S. PROVEN RESERVES
(Millions of barrels—Trillions of cubic feet)

Total liquids—Jan. 1, 1950	28,378
Total liquids—Jan. 1, 1949	26,821
Increase	1,557
Natural gas—Jan. 1, 1950	180.381
Natural gas—Jan. 1, 1949	173.869
Increase	6.512
Natural gas liquids—Jan. 1, 1950	3,729
Natural gas liquids—Jan. 1, 1949	3,541
Increase	188
Crude oil—Jan. 1, 1950	24,649
Crude oil—Jan. 1, 1949	23,280
Increase	1,369

TABLE 2—STATES RESPONSIBLE FOR MAJOR PORTION OF PROVEN RESERVES INCREASE DURING 1949
(Liquids in millions of barrels—Gas in trillion cubic feet)

State	—Proven reserves increases during 1949— Natural gas	Total liquids	Crude oil	Nat. gas liquids
Texas	3.462	1.095	1.026	69
Oklahoma	0.294	113	79	34
Louisiana	2.710	113	40	73
Illinois	0.005	77	74	3
California	0.201	72	59	13
Kansas	0.318	68	64	4
New Mexico	0.635	45	40	5
Mississippi	0.025	36	37	—1
Utah	0.004	15	15	
Subtotal	6.608	1.634	1.434	200
All other states—net	0.096	77	65	12
Total United States	6.512	1.557	1.369	188

TABLE 3—ESTIMATED PROVEN RESERVES OF LIQUID HYDROCARBONS IN THE UNITED STATES
(Thousands of barrels)

	Proven reserves as of 12-31-48 1	Extensions and revisions 2	New discoveries 3	Production during 1949 4	Proven reserves as of 12-31-49 (Cols. 1 + 2 + 3 less Col. 4) 5	Changes in reserves during 1949 (Col. 5 less Col. 1) 6
Alabama	3,547	448		448	3,547	
Arkansas	357,499	24,279	2,540	31,213	353,105	—4,394
California	4,071,491	255,911	175,755	360,131	4,143,026	71,535
Colorado	401,757	—2,588	75	30,242	369,002	—32,755
Illinois	417,527	133,147	11,897	67,767	494,804	77,277
Indiana	49,187	2,776	7,875	9,503	50,335	1,148
Kansas	776,739	142,952	27,868	102,764	844,795	68,056
Kentucky	73,610	3,190	3,697	11,084	69,413	—4,197
Louisiana	2,393,386	260,873	61,516	209,584	2,506,191	112,805
Michigan	70,449	9,681	4,235	16,666	67,699	—2,750
Mississippi	423,010	72,474	2,215	38,432	459,267	36,257
Montana	122,944	2,747	292	9,880	116,103	—6,841
Nebraska	865	400	650	291	1,624	759
New Mexico	632,478	55,356	42,002	51,895	677,941	45,463
New York	67,116			4,216	62,900	—4,216
Ohio	30,206	2,765	13	3,611	29,373	—833
Oklahoma	1,450,789	240,302	41,008	168,151	1,563,948	113,159
Pennsylvania	112,451	5,158	79	11,689	105,999	—6,452
Texas	14,558,892	1,340,319	586,778	832,546	15,653,443	1,094,551
Utah	1,016	15,057	602	636	16,039	15,023
West Virginia	51,911	4,107	1,494	6,689	50,823	—1,088
Wyoming	752,094	20,350	12,355	49,334	735,465	16,629
Miscellaneous	2,263	1,935	36	575	3,659	1,396
Total U. S.	26,821,227	2,591,639	982,982	2,017,347	28,378,501	1,557,274

down in the face of an inventory ratio that was very high. The high inventory ratio of 19.27 at the end of 1948 was reduced only slightly to 18.78. Thus an increase in new reserves of only 5.32 per cent over 1948 was enough to keep the inventory ratio almost at its previous high mark. In the opinion of some observers, this ratio should not exceed 15. This may or may not be correct.

Natural-gas reserves again showed a substantial increase, and despite the new pipe-line outlets and new markets, the inventory ratio of proven reserves to withdrawals dropped only a shade. The inventory ratio was 28.88 at the end of 1949 compared to 28.94 at the end of 1948. It is difficult to foresee just where the market will establish an economic ratio when the present pipe-line expansion program slows down. It will probably be several years before this condition is achieved. In terms of cubic feet, gas reserves increased 3.75 per cent over the previous year.

The actual figures are shown in brief summarized form in Table 1; the areas of the principal increases are given in Table 2; while Tables 3, 4, and 5 give some detailed breakdowns on total liquids, crude oil only, and natural gas only.

TABLE 4—ESTIMATED PROVEN RESERVES OF CRUDE OIL IN THE UNITED STATES

(Thousands of barrels)

	Proven reserves as of 12-31-48 1	Extensions and revisions 2	New discoveries 3	Production during 1949 4	Proven reserves as of 12-31-49 (Cols. 1 + 2 + 3 less Col. 4) 5	Changes in reserves during 1949 (Col. 5 less Col. 1) 6
Alabama	3,547	448		448	3,547	
Arkansas	300,042	23,130	2,412	28,121	297,463	—2,579
California	3,763,583	225,915	166,195	332,942	3,822,751	59,168
Colorado	365,458	2,719	50	23,415	344,812	—20,646
Illinois	393,365	126,909	11,816	63,952	468,138	74,773
Indiana	49,079	2,747	7,855	9,472	50,209	1,130
Kansas	674,395	136,379	27,755	100,139	738,390	63,995
Kentucky	59,209	2,875	3,540	9,456	56,168	—3,041
Louisiana	1,869,290	179,699	43,695	182,915	1,909,769	40,479
Michigan	69,383	9,443	4,217	16,547	66,496	—2,887
Mississippi	365,446	71,034	2,114	35,734	402,860	37,414
Montana	118,944	2,827	272	9,650	112,393	—6,551
Nebraska	865	400	650	291	1,624	759
New Mexico	552,231	46,204	41,266	47,479	592,222	39,991
New York	67,116			4,216	62,900	—4,216
Ohio	28,542	2,646		3,485	27,703	—839
Oklahoma	1,250,401	197,240	33,056	150,779	1,329,918	79,517
Pennsylvania	109,806	5,000		11,450	103,356	—6,450
Texas	12,484,218	1,229,877	531,984	736,347	13,509,732	1,025,514
Utah	807	15,050	600	626	15,831	15,024
West Virginia	36,697	3,000	1,125	2,830	37,992	1,295
Wyoming	715,787	11,934	11,815	47,931	691,602	—24,185
Miscellaneous	2,233	1,552		572	3,613	1,380
Total U. S.	23,280,441	2,297,428	890,417	1,818,800	24,649,489	1,369,045

TABLE 5—ESTIMATED PROVEN RECOVERABLE RESERVES OF NATURAL GAS IN THE UNITED STATES

(Millions of cubic feet—14.65 psia., at 60° F.)

	Reserves as of 12-31-48	Extensions and revisions	Disc. of new fields and new pools in old fields	Net change in underground storage*	Net production†	Total
Arkansas	901,838	27,739	3,783	15	59,185	874,190
California	10,192,593	151,526	187,899	3,105	543,488	9,991,635
Colorado	1,349,179	—102,384	5,128	0	24,828	1,227,095
Illinois	227,804	29,378	16,140	0	40,130	233,192
Indiana	21,600	5,890	3,960	0	6,250	25,200
Kansas	14,407,832	—8,123	10,855	2,279	323,283	14,089,560
Kentucky	1,378,151	50,381	8,400	2,465	90,000	1,349,397
Louisiana	23,977,520	2,238,587	1,277,430	0	805,726	26,687,811
Michigan	182,987	39,514	3,683	6,165	17,438	214,911
Mississippi	2,504,336	81,499	12,084	0	68,950	2,528,969
Montana	852,605	—16,646	4,021	1,416	37,925	803,471
New Mexico	5,606,361	737,698	146,287	7,363	256,706	6,241,003
New York	67,615	225	0	2,545	3,700	66,685
Ohio	629,453	42,264	9,225	18,629	47,000	652,571
Oklahoma	11,332,445	606,335	251,012	3,522	567,335	11,625,979
Pennsylvania	617,410	48,148	8,700	17,422	70,000	621,680
Texas	95,708,553	3,963,647	2,521,917	0	3,023,714	99,170,403
Utah	69,798	1,754	338	0	6,313	65,577
West Virginia	1,737,167	116,372	24,500	17,194	180,000	1,715,233
Wyoming	2,093,740	43,692	107,958	626	72,339	2,173,677
Miscellaneous	10,353	3,933	9,550	0	731	23,105
Total U. S.	173,869,340	8,061,429	4,612,870	82,746	6,245,041	180,381,344

*The net difference between gas stored in and gas withdrawn from underground storage reservoirs. †Net production equals gross withdrawals less gas injected into underground reservoirs; changes in underground storage are excluded. December production estimated occasionally.

Imports Up Again

Total reaches 886,800 bbl. daily for another record

IMPORTS of crude and products into continental United States in the month of January averaged 886,800 bbl. daily to set a new record, according to tabulations of the Department of Commerce.

This represents an increase of 11.6 per cent over the previous record set in December and is 37.2 per cent greater than the average for January of last year.

Total crude imports amounted to 16,537,000 bbl., up 2,554,000 bbl. from December and 1,854,000 bbl. more than crude imports in January 1949. Receipts from Venezuela increased 1,204,000 bbl. and imports from Saudi Arabia gained 760,000 bbl. but still were below last year. Total crude from Middle East amounted to 3,498,000 bbl. compared with 2,707,000 bbl. in December and 4,860,000 bbl. a year ago.

Residual fuel topped, by a slight margin, the record set in December and accounted for 36.7 per cent of total imports. The gain for other products included increases for kerosine and unfinished oils.

Total exports, excluding shipments to territories, were off 1,126,000 bbl. from December and 3,365,000 bbl. from January 1949. Compared with December totals, crude shipments decreased almost 600,000 bbl. and gasoline more than 400,000 bbl. Lube-oil exports were off 355,000 bbl. but other products gained 248,000 bbl., principally distillate fuel.

IMPORTS INTO CONTINENTAL UNITED STATES

(Thousands of barrels)

	Jan. 1950	Dec. 1949	Jan. 1949
Crude—			
Mexico	685	592	247
Colombia	1,389	1,031	844
Venezuela	10,857	9,653	8,732
Iraq			226
Iran	123		803
Kuwait	1,892	1,984	2,088
Saudi Arabia	1,483	723	1,743
Other	108		
Total crude	16,537	13,983	14,683
Barrels daily	533,452	451,065	473,645
Products—			
Residual fuel	10,096	10,057	5,131
Other products	858	584	224
Total products	10,954	10,641	5,355
Barrels daily	353,354	343,258	172,742
Total all oils	27,491	24,624	20,038
Barrels daily	886,806	794,323	646,387

EXPORTS*

	Jan 1950	Dec 1949	Jan 1949
Crude	2,130	2,722	2,127
Gasoline	1,178	1,605	3,498
Lube oils	941	1,296	1,068
Other products	2,007	1,759	2,928
Total all oils	6,256	7,382	9,621
Barrels daily	201,806	238,129	310,355

*Excludes shipments to territories.

Swirl Knocks Knocks

Automotive engineers find turbulence in cylinder head stops engine knock and improves octane rating of fuel

George Weber

DETROIT.—The contention that automotive engineers could improve the average engine's utilization of present-day high-octane fuel was given further support here this week at the national passenger-car meeting of the Society of Automotive Engineers.

The key lies in "swirl," or turbulence of the fuel mixture. Properly imparted by design of the combustion chamber, swirl prevents knocking and provides "mechanical octane numbers" equivalent to increasing the octane rating of the gasoline.

These were the findings of S. D. Heron and A. E. Felt of Ethyl Corp. as the result of laboratory research with a single-cylinder test engine.

Carefully qualifying their data as confined to laboratory research limits, they made no claims for successful application of their findings to multicylinder commercial engines. However, their study pointed to an open avenue of approach to engine improvement—better design of combust.on chambers.

More swirl.—In general, their report showed that increased turbulence in the combustion chamber has rather considerable effects on improving part-load economy and knock-limited performance. On the basis of their data, turbulence is also shown to reduce engine severity.

Their study concerned a single-cylinder engine designed specifically to test the effects of turbulence as governed by combustion-chamber design. The engine has a flat head and the cylinder is of passenger-car-engine size. Tests were run with normal and shrouded intake valves, and with flat-top and squish-type pistons.

Shrouding of intake valves induces swirl, or what is called induction turbulence in the fuel-air mixture in the combustion chamber. Squish-type pistons, developed originally for diesel studies, contain the combustion chamber within the head of the piston and induce what is termed compression turbulence.

Combinations of these design features gave researchers four degrees of turbulence, ranging from that using a normal intake valve and flat-top piston to the maximum employing shrouded intake valve and squish-type piston. The engine, termed the "27 cylinder" was run at widely varying conditions.

Pistons at fault.—The engine design provided no change of compression ratio with a movable cylinder, thus the compression ratio is a direct function of the piston design. Four pistons giving four types of combustion-chamber designs were used in the engine, with compression ratios ranging from 5.7 to 15 to 1.

Operation at this range was explored rather completely, and included determination of fuel economy at 1,200 and 3,000 r.p.m. with particular emphasis on part-load economy. Knocking characteristics were investigated in all cases at 1,200 and 2,400 r.p.m. and in some cases up to 3,000 r.p.m. Limited investigation was carried out on knocking characteristics at compression ratios of 21.3 to 30 to 1.

The data from these tests were reported with few broad conclusions or generalizations since as the authors state, "the cylinder is quite lacking in resemblance to any existing passenger-car engine and can only be regarded as an implement of research to be used for showing trends rather than actual values which can be translated into passenger-car engine practice."

They allowed themselves these observations, however: "The work with the 27 cylinder strongly supports the case for a high degree of turbulence. In the presently reported work turbulence has shown up as the mo.t important source of mechanical octane numbers."

Shale Test

Swedes test Colorado shale to promote sale of retorts

WASHINGTON.—Efficiency of Swedish retorts in the production of oil from American shale will be tested out in the near future by Colorado interests which, it is understood, are studying the possibilities of commercial operations in this country.

The proposal was disclosed this week with issuance by the Missouri Pacific Lines of a new freight rate on oil shale from Rifle, Colo., to Gulf ports for export.

The prospect of establishing a plant using the Swedish equipment, however, is still in the relatively distant future. Initial plans call for the shipment of only a few tons of shale, possibly less than 20, for a 2 or 3-day experimental run in Sweden.

Although definite statistics are unavailable, the Swedish synthetic fuel industry is said to be on a going basis, supplying not only some oil from indigenous shale but also gas for several cities. It is reported to be on at least a break-even basis, although it is not known whether this is due to the tax or other advantages which may have been advanced by the Swedish Government.

Difference of view.—The Bureau of Mines is understood to have given some thought to a study of the Swedish retorts to see whether they would be useful in its present research program, but to have come to the conclusion that while they are highly efficient on Swedish shale they would probably not do for the American rock.

The Swedish manufacturers, however, are confident that their equipment will operate successfully on our shale and have a representative in the United States who is trying to induce American interests in it.

If the initial tests in Sweden show signs of promise, it is expected that further and larger shipments of shale will be provided for and a cooperative agreement sought of the bureau by the Colorado interests. Such agreements are provided for in the Synthetic Liquid Fuels Act, and large shipments of shale have been made under them to Standard Oil Co. (N. J.) in Louisiana and Union Oil Co. in California. The bureau is providing the shale for export to Sweden and the Colorado interests are understood to be footing the transportation bill.

Cost claims.—The bureau last week reported that it can now produce shale oil for less than the cost of crude petroleum and that refined products can be produced at an actual cost averaging 7.3 cents per gallon, which would make for a wholesale price of 9 cents after allowing a profit of 6 per cent on the average unamortized capital investment and allowing for income taxes. The corresponding figures on synthetic products from coal would be 10.8 and 14.5 cents, respectively.

The bureau now estimates that a capital outlay of approximately $240,000,000 would be required to start a commercial industry in Colorado, which would call for five 10,000-bbl. plants and a 50,000-bbl. pipe line to the Pacific Coast which would be necessary to solve the greatest remaining problem, that of finding and reaching a market.

So far, it appears probable that an industry based on shale would be more economical than one based on coal, which would require a $246,800,000 investment for a 30,000-bbl. plant.

EUROPE

Marshall-Plan Needs

ECA lists needs of cooperating countries for next year; foresees big increase in crude from nondollar sources

Bertram F. Linz

WASHINGTON.—The Marshall-plan countries will require 711,000 bbl. daily of crude oil during the fiscal year 1950, against 580,000 bbl. during the current year, but will need only 433,000 bbl. of products against 462,000 bbl., it is estimated by the Economic Cooperation Administration.

Their need for dollar crude oil will increase from 203,000 bbl. this year to 241,000 bbl. in 1951, but their takings of nondollar crude will increase from 377,000 to 470,000 bbl. In refined products, Europe will reduce its takings of dollar oil from 175,000 to 143,000 bbl. daily, while increasing its receipts of nondollar products from 287,000 to 290,000 bbl.

The total need for crude and products will be 1,144,000 bbl. daily against 1,043,000 bbl. which, after allowing for refinery losses, will give the Marshall-plan countries a refined-products equivalent of 1,078,000 bbl. daily against 994,000 bbl. this year.

Data submitted to the House interstate commerce oil subcommittee by ECA officials last week showed that Europe's total expenditures for crude and products in fiscal 1951 will be $995,800,000 against $1,062,600,000 for the current year. Of this, $374,800,000 will be for dollar oil against $440,000,000 this year.

ECA revision.—These figures represent the results of ECA's revision of the European programs as submitted by the individual countries and by the Organization for European Economic Cooperation. In the past, ECA has proved nearer right than have either the countries or the OEEC as, for example, in the fiscal year 1949, when the OEEC estimate called for imports of 995,000 bbl. daily of crude and products and the ECA cut it down to 973,000 bbl.; actual imports for the year were 953,000 bbl. daily.

In 1951, exports of crude and products to Europe from the United States will drop to 40,000 bbl. daily, or 3.7 per cent of the total supply, from 54,000 bbl., or 5.5 per cent, this year. In 1947 we exported 154,000 bbl. daily, representing 20.5 per cent of the total, and back in 1938 the average export was 206,000 bbl. a day, or 27.8 per cent.

From the rest of the Western Hemisphere, Europe will get 254,000 bbl. of crude and products daily, against 269,000 bbl. this year, and a high of 378,000 bbl. in 1948. In 1951 these sources will supply 23.6 per cent of Europe's needs against 27.7 per cent this year and 41.4 per cent in 1948.

The bulk of Europe's supply will originate in the Middle East, 783,000 bbl. daily, or 72.7 per cent of the total, against 650,000 bbl., or 66.8 per cent this year.

By countries.—The ECA estimates that the several participating countries, individually, will have oil requirements of the following proportions in fiscal 1951:

Austria: 1,000 bbl. daily of products, all from nondollar sources, the same as this year.

Belgium-Luxemburg: 30,000 bbl. of products, evenly divided between dollar and nondollar, against 28,000 bbl. this year; and 9,000 bbl. of crude, of which 3,000 bbl. will be dollar, the same as this year.

Denmark: 27,000 bbl. of products, 7,000 of it from dollar sources, against 24,000 bbl.; and 1,000 bbl. of crude, all nondollar, against none this year.

France: 2,000 bbl. of products, 1,000 each from dollar and nondollar sources, against 5,000 this year; and 255,000 bbl. of crude, 111,000 of it dollar, against 223,000.

Germany: 6,000 bbl. of products, split between dollar and nondollar evenly, against 19,000 bbl.; and 39,000 bbl. of crude, 16,000 of it dollar, against 22,000.

Greece: 19,000 bbl. of products, only 1,000 of it from dollar sources, against 18,000.

Iceland: 4,000 bbl. of products, 1,000 from dollar sources, the same as this year.

Ireland: 11,000 bbl. of products,

UNDER THE THAMES.—Sand-hogs are shown coming out of the entrance air lock of a 900-ft. tunnel 50 ft. under the Thames River at Shell Haven, Essex, where the tube is now under construction to supply cooling water for Shell's new refinery. River water will be carried through the 9-ft. tunnel by pumps installed 30 ft. below ground level. Cast-iron lining is erected as the tunnel miners excavate mud from the river bed and bring it to the surface, and the outside is finished by pumping cement grout behind the lining. Water is kept from entering the tunnel by compressed air.

SUPERVISING JAPAN'S OIL.—Members of the petroleum division, G-4 Section, General Headquarters, Supreme Commander of Allied Powers, are shown at a recent meeting with the petroleum advisory group in Tokyo. Front row, left to right: Lt. Col. Gus H. Montgomery, El Centro, Calif., area petroleum officer; George J. Jillson, Reno, Nev., chairman, petroleum advisory group; Col. Earl R. Chase, Austin, Tex., chief, G-4 Section; and Thomas P. Nock, Berkeley, Calif., petroleum advisory group. Back row, left to right: Fred C. Weyand, San Francisco, advisory group; Gordon E. Torrey, Bar Harbor, Me., advisory group; John C. Lumgair, England, advisory group; and Lt. Col. Chris C. Reger, San Antonio, Tex., deputy area petroleum officer.

4,000 from dollar sources, the same as this year.

Italy: 10,000 bbl. of products, 4,000 from dollar sources, against 14,000; and 92,000 bbl. of crude, 55,000 from dollar sources, against 73,000.

Netherlands: 6,000 bbl. of products, evenly divided between dollar and nondollar, against 19,000; and 82,000 bbl. of crude, 21,000 of it dollar, against 62,000.

Norway: 33,000 bbl. of products, 10,000 of it dollar, against 30,000; and a negligible amount of crude.

Portugal: 9,000 bbl. of products, 4,000 of it dollar, against 8,000; and 5,000 bbl. of crude, 2,000 of it dollar, the same as this year.

Sweden: 36,000 bbl. of products, 16,000 from dollar sources, against 35,000; and 24,000 bbl. of crude, 7,000 of it dollar, against 21,000.

Switzerland: 17,000 bbl. of products, 7,000 from dollar sources, the same as this year; and 1,000 bbl. of dollar crude, also the same.

Trieste: 13,000 bbl. of crude, 6,000 of it dollar, the same as this year.

Turkey: 11,000 bbl. of products, 5,000 from dollar sources, the same as this year.

United Kingdom: 211,000 bbl. of products, 62,000 of it from dollar sources, against 218,000; and 189,000 bbl. of crude, 19,000 from dollar sources, against 146,000 bbl.

Expansion program.—The Marshall-plan countries' expansion programs call for a total expenditure of $757,500,000 in 1951 against $694,600,000 this year. Of these amounts, $362,200,000 will be spent in the participating countries against $319,800,000 this year, with $113,000,000 of it in the United Kingdom against $79,000,000; and $395,300,000 in other areas outside Europe and North America, against $374,800,000.

The total expenditure, as broken down by ECA, will be divided as follows: American-company dollar investments, $32,300,000 ($21,300,000 of it in the United Kingdom) against $16,900,000 this year; ECA financing (all in participating countries), $16,100,000 against $13,800,000; proceeds of American loans, $19,000,000, the same as this year; other financing, $80,200,000 against $73,000,000. The expenditure for dollar supplies and services is placed at $147,600,000, against $122,700,000 this year, and the nondollar expenditure will be $639,900,000 against $571,900,000.

It is in the equipment field, particularly, that ECA does not see eye to eye with the Marshall-plan countries. Prewar, western Europe had an intake capacity of 233,000 bbl. daily, and at the end of 1948 its capacity was 485,000 bbl. The first stage of the European program calls for the addition of 545,000 bbl. of which 115,000 would be financed by ECA, 245,000 would not require ECA assistance, and 185,000 has not yet been decided; the second stage, planned for another 285,000 bbl., would give a total capacity in 1953 of 1,315,000 bbl. daily. ECA says this is about 200,000 bbl. more than is required, and will lead to surpluses of which it will be difficult to dispose.

New German Record

Continued success with development drilling in new fields in Western Germany has been reported. In the Emsland area, 3 Ruehlermoor obtained production in the Bentheim sandstone at 2,670-2,802 ft. and flowed initially at about 150 bbl. daily.

The No. 3 well indicates that Ruehlermoor-Ruehlertwist field extends some 4½ miles in a west-east direction. Another new Emsland well, 1 Scheerhorn, has come into regular production with nearly 600 tons (about 4,200 bbl.) produced the latter part of December.

In the Hanover area in the new Suderbruch field near Nienburg, a second well, located about ½ mile south of 1 Suderbruch, on initial production tests flowed at a rate of 5 cu. m. (about 31 bbl.) per hour through a 10-mm. (0.39-in.) choke. The 2 Suderbruch was drilled to the Cornbrash sand from 6,693-6,727 ft. in slightly more than 3 months. The operations are jointly by Gewerkschaft Brigitta and Deutsche Vacuum.

Two portable Failing rigs recently arrived in Hamburg from the United States for use in drilling in the Hanover district. Six other rigs are expected to be received in the near future.

A new monthly drilling record was established in Western Germany in November, the last month for which complete figures are available. Total footage was about 105,000 ft. (32,066 m.) compared to about 95,000 ft. (29,112 m.) in the previous month. Twenty per cent of the November total was on exploratory wells.

Ciepsa Wildcat Dry

The second wildcat test of Ciepsa in northern Spain has been completed dry, and it is understood that Socony-Vacuum Oil Co., Inc., is discontinuing further participation in the exploratory program.

The well was drilled in Soria Province about a mile south of Burgo de Osma. The well was plugged and abandoned in the Triassic late in February at a total depth of 7,253 ft.

Ciepsa (Cia. de Investigaciones y Exploraciones Petroliferas, S. A.) is a joint company in which ownership is shared equally by Socony-Vacuum and Cia. Espanola de Petroleo, S. A., a Spanish company. It was organized in 1940 to carry out exploration work in Spain. The first test on the Oliana area in Lerida Province was abandoned in 1948 after reaching a depth of 7,622 ft.

Austria Gets Producer

The Soviet Mineral Oil Administration is reported to have found oil production in Alderklaa, a field in the Vienna basin of Austria which has been producing gas and a small amount of distillate.

According to unofficial reports filtering out of the closely guarded Russian operating areas, a recent well came in for about 500 bbl. daily. It appears that the oil production is a few hundred meters below the gas-producing formation.

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France Wants Iraq Line

Shipment of more Kirkuk crude to Mediterranean to supply French refineries declared essential to nation's economy

Dahl Duff

ARGUMENTS in favor of early construction of the 30-in. Iraq Petroleum Co., Ltd., pipe line from Kirkuk field to the eastern Mediterranean are advanced in the pamphlet, "France and the Problem of Oil," which was recently issued by the French Embassy.

The French Government controls Cie. Francaise des Petroles which holds a 23.75 per cent interest in Iraq Petroleum Co. This is the only important nationally controlled source of crude oil for France's growing refining industry *(see "Surplus Capacity," in The Oil and Gas Journal, March 9, page 58).*

From Iraq, France ultimately hopes to obtain 7,000,000 tons of crude a year, or about 140,000 bbl. daily. This would be nearly 40 per cent of the requirements of the total projected French home refining capacity.

Since France holds only slightly less than a quarter share of I.P.C., this means total I.P.C. production must be built up to 30,000,000 tons, or about 600,000 bbl. daily. This involves problems for the other I.P.C. partners in disposing of this output along with production from their other major Middle East interests.

Critical shortage foreseen.—As a result of a slow-down of oil exploration in many parts of the world and increasing consumption, "oil supply has become an international problem which countries that are entirely dependent upon foreign sources find it difficult to solve," the pamphlet said.

"France's critical shortage of oil imports after the war was met by Marshall plan aid and by two agreements relating to Iraq Petroleum Co. The first of these recognized French rights in this enterprise, which had been contested at the time of liberation. The second, signed by the participating nations in November 1948, provided for maximum exploitation of the company's concessions through the construction of a 30-in. pipe line from Kirkuk to the Mediterranean.

"In view of this arrangement, the C.F.P. (Cie. Francaise des Petroles) dropped the suit it had instituted against the American groups in the I.P.C. at the time of their entrance in Arabian American Oil Co., a procedure that ran counter to the Anglo-French-American agreements of 1928 concerning Iraq Petroleum Co."

The French statement pointed out that capacity of the system of 12 and 16-in. pipe lines out of the Iraq fields would be 13,000,000 tons (260,000 bbl. daily) were both 16-in. lines completed and in operation. (The 12 and 16-in. branch to Haifa has been blocked nearly 2 years by the Arab-Israeli political strife.)

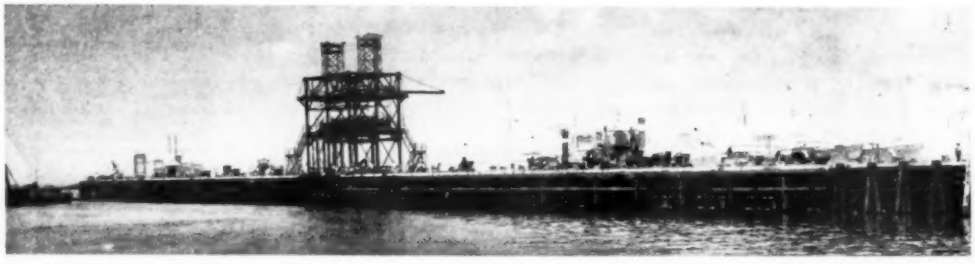
Kirkuk's potential.—"This figure (13,000,000 tons) is far from the maximum potential output of Kirkuk field, one of the most extensive in the world, with an estimated reserve of 1 billion tons. Furthermore, its deposits lie close to the surface, and its development requires only a limited number of wells due to their extraordinary richness (the daily output of each well is 1,200 tons daily, or about 800 times as much as the average daily output of American wells).

"In the face of Europe's increasing need for oil, the development of the exceptional potential of Kirkuk, the field closest to the European market, is urgently necessary. It can be insured only by the construction of the 30-in. pipe line provided by the November 1948 agreement of the I.P.C. This can be built under advantageous conditions compared to those under which the Middle East (the Jersey Standard, Socony-Vacuum, Anglo-Iranian line from Iran to the Mediterranean) and the Trans-Arabian pipe lines were planned."

Easy to build.—The pamphlet said that the 30-in. I.P.C. line would require far less steel and only two-fifths of the power of the Tapline. The I.P.C. line will not require so much specialized equipment and has the advantage of being able to bring pipe up to the route by rail at Homs, Syria, and Basra, Iraq. For example, it added, truck transportation of pipe from the rail terminals will amount to only 18,000,000 ton-kilometers for the I.P.C. project, as compared to 85,000,000 ton-kilometers for Tapline.

In addition, the French document continued, the I.P.C. line can be built much quicker than the other Middle East projects, and has at its disposal a network of communications of well-organized bases of construction and operation in the existing 12 and 16-in. system.

Backing up this contention, the following table was given:



FOR BIG TANKERS.—This is the new East Finger Pier of Lago Oil & Transport Co., Ltd., at Aruba, N.W.I. It is one of the largest all-welded steel oil piers in the world.

The 790-ft. pier is designed to take two 26,000-ton tankers at the same time. Formerly crude for Lago's 390,000-bbl.-daily refinery was brought from Lake Maracaibo by shallow-draft lake tankers. Completion of Creole Petroleum Corp.'s Ule-Amuay Bay refinery makes transport of oil from Amuay to Aruba by T-2s and modern large-size tankers practical and economical.

Knappen Tippets Abbett Engineering Co., New York, designed the pier, and construction was by Netherlands Harbor Works Co., Ltd. Eighteen lines for loading and unloading are carried. The large superstructure shown in the photograph is the hose-handling tower.

The pier is 34 ft. wide and is supported on 84 piles which were driven to a maximum of 120 ft. in the silty sand and coral. It replaces a 20-year-old "T" pier and is the first of two new piers to be built in Aruba's San Nicolas Harbor.

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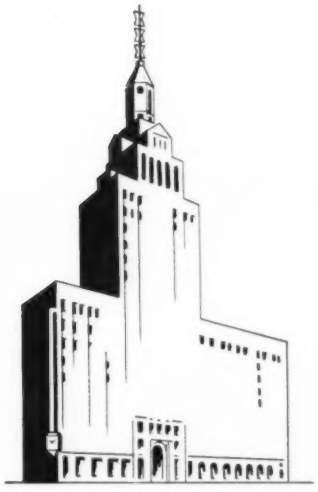

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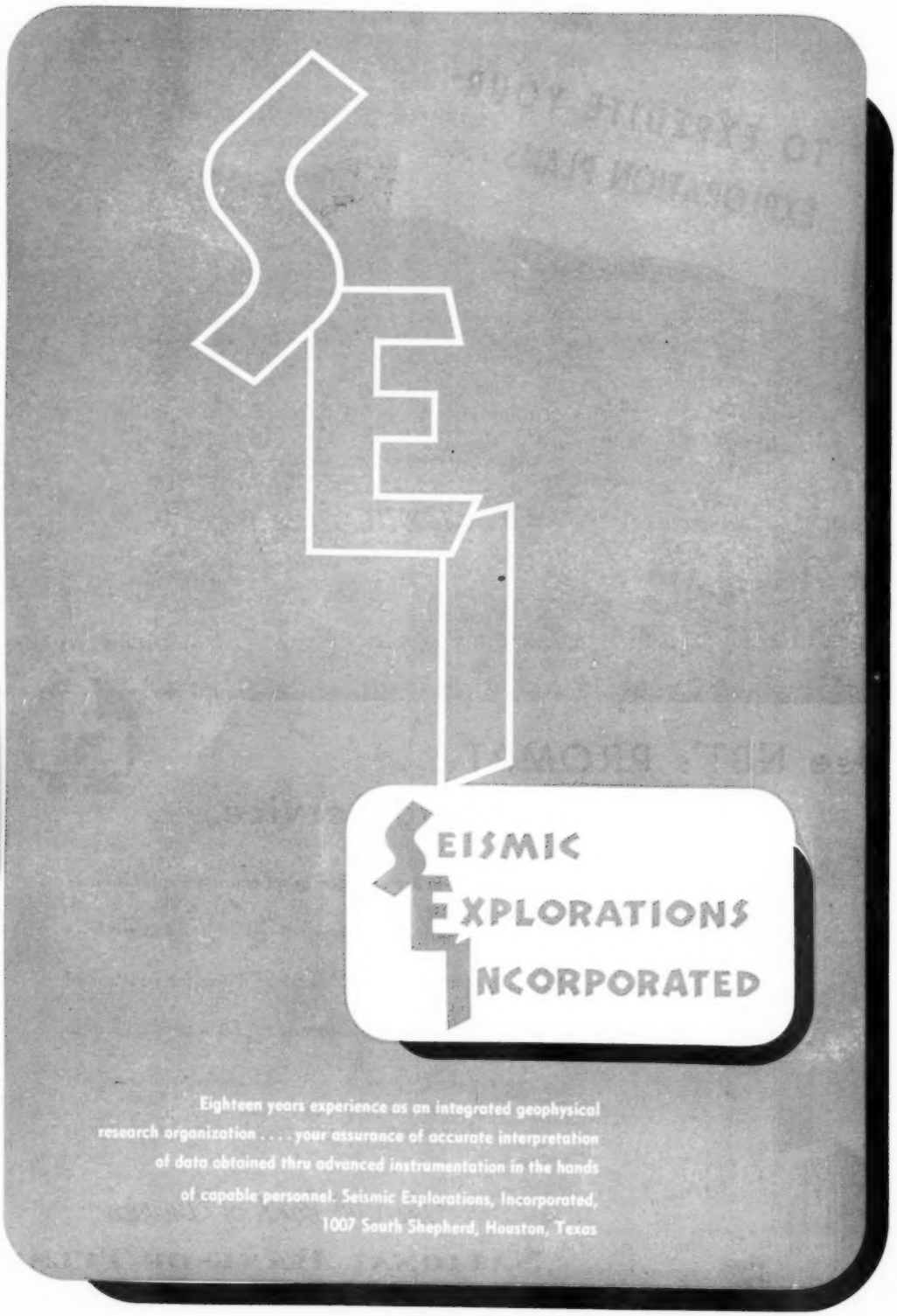
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Distance (terminals)	Trans-Arabian Abqaiq-Sidon	Middle East Persian Gulf-Tartus	I.P.C. Kirkuk-Banias	
Diameter in inches	30-31	34-36	30-32	
Length in kilometers	1,725	1,260	895	
Length in miles	1,070	780	555	
			First stage	Second stage
Annual capacity, millions of tons	15	25	15	23
Steel, in tons	385,000	470,000	245,000	290,000
Power, in horsepower	80,000	120,000	35,000	105,000

"The Iraq Petroleum Co.'s new pipe line will be of use to the European economy as well as to that of Iraq," the French pamphlet said. "The O.E.E.C. (Organization for European Economic Cooperation) plan for European oil refining foresees a French refining capacity of 18,775,000 tons by the beginning of 1953. This means that France must have $320,000,000 worth of crude oil. But by that date, Marshall-plan credits will be withdrawn and France will have to reduce her foreign-exchange payments for oil purchases.

Essential to economy. — "What will the production situation of I.P.C. be at that time? The double network of the 16 and 12-in. lines, at full capacity, will produce 13,000,000 tons a year. To this must be added approximately 4,000,000 tons of crude oil produced at the Basra and Qatar fields, which also belong to I.P.C. When the 30-in. line is completed, another 13,000,000 tons will be added to the 17,000,000 tons total. France's share of this will be 7,000,000 tons, with a commercial value of $120,000,000. The 30-in. line is therefore essential to France's economic development."

It was also stated that during the year 1948-49, Cie. Francaise gave I.P.C. £3,040,000 for capital expenditures and £1,140,950 for exploration by companies affiliated with I.P.C.

As far as is known, plans for the 30-in. I.P.C. project are moving forward. Contrary to previous procedure, I.P.C. is understood to be preparing to use an American contractor for laying the line.

Some time back, it was reported that the Middle East project would be preceded by this 30-in. I.P.C. line. Apparently the French insistence on early construction of the project as well as the position of Iraq, which must give a transit permit for the Middle East line, were responsible for this changed sequence.

LATIN AMERICA

Tucupido Stepout Finaled

A 1,500-m. stepout southeast of the easternmost outpost well of Tucupido field in central Venezuela has been successfully completed by Venezuelan Atlantic Refining Co. in the 37,500-acre Tucupido concession jointly owned by Venezuelan Atlantic and Pancoastal Oil Co.

It was announced that the well, 211 Tucupido, was drilled into a pay section of the Chaguaramos sand at 3,000 ft. and was completed in a total of 7 days to produce 1,368 bbl. daily through a ½-in. choke. Gravity of the oil is 39°.

The new well offsets another Chaguaramos producer drilled by Venezuelan Atlantic on its wholly owned Taman field, located immediately to the north of Tucupido's north boundary. A 500-m. stepout to the south of No. 211 is nearing completion.

Pancoastal also announced that production from Jose Ruiz field, 15 miles south of Tucupido and also jointly owned with Venezuelan Atlantic, is now averaging 5,400 bbl. daily. Two new completions have given the field 19 producers, and drilling is continuing with two rigs. Thus far, Pancoastal said, approximately 2½ sq. miles of the 12,500-acre No. 3 Ruiz concession have been proved. Total production from Tucupido and Ruiz fields of Venezuelan Atlantic and Pancoastal now approximates 11,500 bbl. daily.

AFRICA

Oued Beth Development

Fourteen wells are now producing in the new Oued Beth field of French Morocco, east of Casablanca. The wells, all of which are flowing, are currently producing about 750 bbl. daily with a potential production about 10 times that quantity. The field is now defined with a producing area of approximately 250 acres.

The production is owned by Soc. Cherifienne des Petroles (S.C.P.) which is controlled by French interests and the Government of French Morocco. The crude oil is refined in a 1,500-bbl. topping plant adjoining the field at Petitjean. The crude oil has a 34° A.P.I. gravity. The products are sold locally and are shipped by rail to Casablanca and other points where they are finally distributed by existing marketing companies.

Three rigs are now drilling in the field. Two are of the portable type—Franks and Unit rigs—and one is of French manufacture. The drilling depth is approximately 3,100 ft. and the wells are producing from the Primaire formation.

S.C.P. also has four wildcat tests operating in the same general area. Three are Wilson rigs and one Unit rig. The deep tests are equipped to drill to 10,000 ft. The only other fields in French Morocco are located at Tselfat and Ain Hamra. They have a production of less than 50 bbl. daily from shallow depths.

ASSOCIATIONS

Vital Needs Discussed

LOS ANGELES.—The vital work done by the Petroleum Equipment Suppliers Association since its inception as a guide to future action, was discussed by Jack Crawford, Youngstown Steel Products Co. of California, speaking at the March 9 Pacific district meeting here. H. R. Safford, Houston, executive secretary of the national group, elaborated on the benefits secured in the past 4 years for members of the steadily growing association of manufacturers, supply companies, and service companies.

Ted Sutter, Baker Oil Tools, Inc., presiding, urged the protection of free enterprise as a major goal of the group. Safford, too, called for a strong and vigilant association to combat future moves to socialize the oil industry.

Web Webster, Emsco Derrick & Equipment Co., Dallas, presented instructive moving picture on the oil industry in the Argentine, to the more than 200 men who attended.

J. A. Crawford, Youngstown Steel Products Co. of California, right, and Ted Sutter, Baker Oil Tools, Inc.

EASTERN

New Asphalt Refinery

NEW YORK.—Plans for the construction of an asphalt refinery of about 2,000-bbl. daily capacity at Wilmington, N. C., were disclosed this week by officials of Mexican Petroleum Corp.

The plant will produce primarily paving asphalt for the local market in the Carolinas. Construction work is to start in the near future with completion scheduled for late fall.

The new processing facility will be built on the company's existing bulk-plant site. Loading facilities and storage for from 150,000 to 200,000 bbl. will be erected. Crude will be brought by tanker, and reduced to finished asphalt in the refinery. Mexican Petroleum is a subsidiary of Pan American Petroleum & Transport Co., Inc., (Standard Oil Co., Indiana).

PERSONALS

Refining Expert

Teitsworth has been with Socony-Vacuum since 1933

CLARK S. TEITSWORTH, who has been director in charge of manufacturing of Socony-Vacuum Oil Co., Inc., since July 1, 1947, began his petroleum-industry career with General Petroleum Corp. at Los Angeles in 1926.

Teitsworth was born in Minneapolis. His father moved to California when he was a year old, and Teitsworth subsequently attended Stanford University, graduating in 1919 with a bachelor of arts degree.

He then attended the graduate schools of the University of Minnesota and California Institute of Technology. An intervening year was spent in the U. S. War Department's Fixed-Nitrogen Research Laboratory in Washington. He joined Celite Co. at Lompoc, Calif., in 1923 and 3 years later went with General Petroleum as a chemical engineer in the process laboratories.

In 1930 Teitsworth became assistant manager of the laboratories, and in 1933 he was moved to Socony-Vacuum's headquarters in New York on a special assignment to investigate whether catalytic cracking was developed sufficiently for commercial application in Socony-Vacuum's refineries. He served as a member of the company's manufacturing committee from 1935 to 1940 and as vice chairman from 1940 to 1945 when he became chairman.

H. J. W. Ten Broeke, formerly exploitation engineer on Shell Oil Co.'s regional production staff at Houston, has been named area chief exploitation engineer, succeeding **C. P. Bristol,** who earlier was named area production manager. Other changes include: **E. V. Hanson,** division geologist at Houston, named area production geologist; **Sam Miron,** named to succeed Hanson as division production geologist; **R. L. Gibson,** appointed exploitation engineer, Corpus Christi division, succeeding **R. J. Dobson,** recently transferred to the regional staff; **C. H. Gregory,** geophysicist at New Orleans, transferred to the problems department; **M. L. Reed,** exploitation engineer at Franklin, La., transferred to the Lake Charles division; **C. A. Stuart,** exploration engineer, moved from the Delta district to Donaldsonville, La., in the same capacity; and **J. E. Walker,** geophysicist at New Orleans, transferred to Calgary, Alta., Canada, in the same capacity.

George T. Briggs has been named assistant manager of the Louisiana producing division, The Texas Co., New Orleans. He has been with the firm 23 years.

W. A. Peterson, field superintendent at Lance Creek, Wyo., for Argo Oil Corp., has been transferred to Hamilton Dome, Wyoming, as district superintendent.

J. W. Hudson, district superintendent at Pauls Valley, Okla., for Republic Natural Gas Co., has been transferred to Dallas as general superintendent of oil and gas production. He will be succeeded at Pauls Valley by **C. C. Book,** assistant district superintendent.

C. D. McDonald, production foreman at Cement, Okla., for Ohio Oil Co., has been named assistant superintendent at Eureka, Kans.

Wayne A. Howard has been appointed secretary of the manufacturing committee, Socony-Vacuum Oil Co., Inc., succeeding **W. H. Zabriskie,** who retired March 1.

Ward C. Pearl, Jr., Norman, Okla., is now serving as geologist for Carl T. Anderson & Co. at Wichita Falls, Tex.

James D. Wells has been appointed marine operating superintendent, Gulf Coast division, Stanolind Oil & Gas Co., Houston. Formerly serving as chief mechanical engineer in the manufacturing department, in his new position he will be engaged in offshore operations in the gulf.

Horace N. Goodell, division geologist at Laramie, Wyo., for Union Oil Co. of California, has been transferred in the same capacity to Denver.

R. G. Bandy, Tulsa, has been named manager of the Midland Cooperative Wholesale Refinery at Cushing, Okla., succeeding **Rex H. Winget,** who will retire on April 1.

Jack M. Fillman, exploitation engineer in the New Orleans area for Shell Oil Co., has been moved to Donaldsonville, La., in the same capacity.

Earl Millroy, superintendent for Loudon Pipeline Co., St. Elmo, Ill., recently joined Johnson Oil Supply Co., Gary, Ind., as refinery superintendent.

S. H. Rockwood, division production engineer for Shell Oil Co. at Oklahoma City, has been transferred to Midland, Tex., as senior exploration engineer. Other changes include: **H. W. Mitchell,** driller at Alice, Tex., transferred to Cuero, Tex., in the same capacity; **Tom Mayhew,** geologist at Houston, transferred to Wichita in that capacity; and **Sidney James,** production foreman at Farmerville, La., transferred in that capacity to Magnolia, Ark.

Donald B. Edwards, chief gas engineer in the manufacturing department of Stanolind Oil & Gas Co., Tulsa, has been appointed chief engineer of the department replacing **A. J. Pettigrove,** who has resigned from the company to look after private business interests. Edwards joined Stanolind in November 1946 as assistant chief gas engineer. A native of Texas, he attended junior college at New Mexico Military Academy, Roswell, and was awarded his chemical engineering degree from Rice Institute in Houston. He is a member of American Petroleum Institute and the Engineers Club of Tulsa.

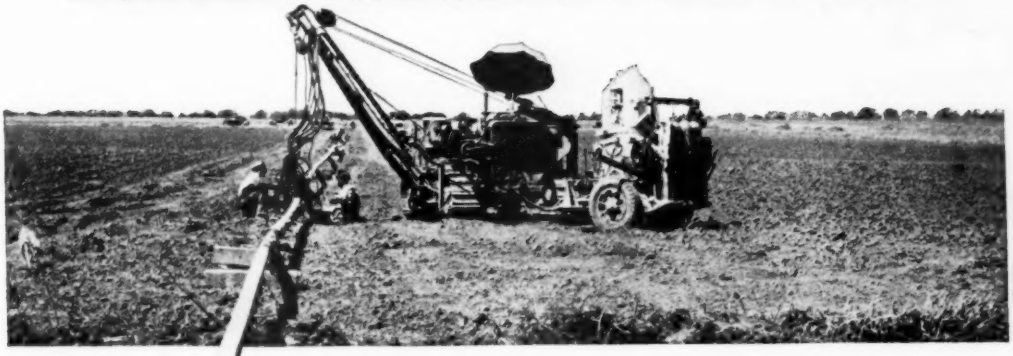
D. B. EDWARDS

J. B. Nolan, until recently area adviser in New York to Standard-Vacuum Oil Co. for the South and East Africa areas, has been appointed chairman of the board and managing director of Vacuum Oil Co. of South Africa, Ltd. He succeeds **W. G. Allin,** who recently retired after 48 years of service. Nolan is the first South African-born head of the company.

Col. L. R. Hulls has resigned as head of the zonal oil office in the Oil Branch, Fuel and Power Division, of the Bizonal Military Government in Frankfurt, Germany, and has become

Shooting Straight

ACROSS THE LONE STAR STATE



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Straight lengths that line up evenly and go into the ditch freely helped speed construction of this 4½" O.D. pipe line in Waller County, Texas. As this line is designed to operate at 1000 pounds per square inch pressure, the uniform high yield strength of Republic Electric Weld Line Pipe is vital, too.

Straight lengths and high yield strength are but two of the ten outstanding qualities of this *modern* line pipe. All ten are listed below. They are the reasons why more than 55,000 miles of Republic Electric Weld Line Pipe have been placed in service during the past twenty-one years . . . the reasons why it continues to deliver ease of installation, trouble-free performance and dependable long life.

1. **Uniform Roundness**—Pipe ends match up perfectly . . . speed construction . . . cut costs.
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4. **Uniform High Yield Strength**—Permits building higher pressure lines—utilizing design values to fullest advantage.
5. **Uniformly Straight**—Lengths line up evenly . . . go into the ditch freely.
6. **Easy to Bend**—High ductility steel makes bending in the field easy.
7. **Easy to Weld**—Low carbon steel welds readily . . . makes sound joints.
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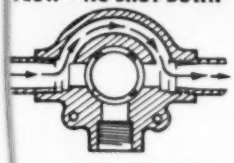

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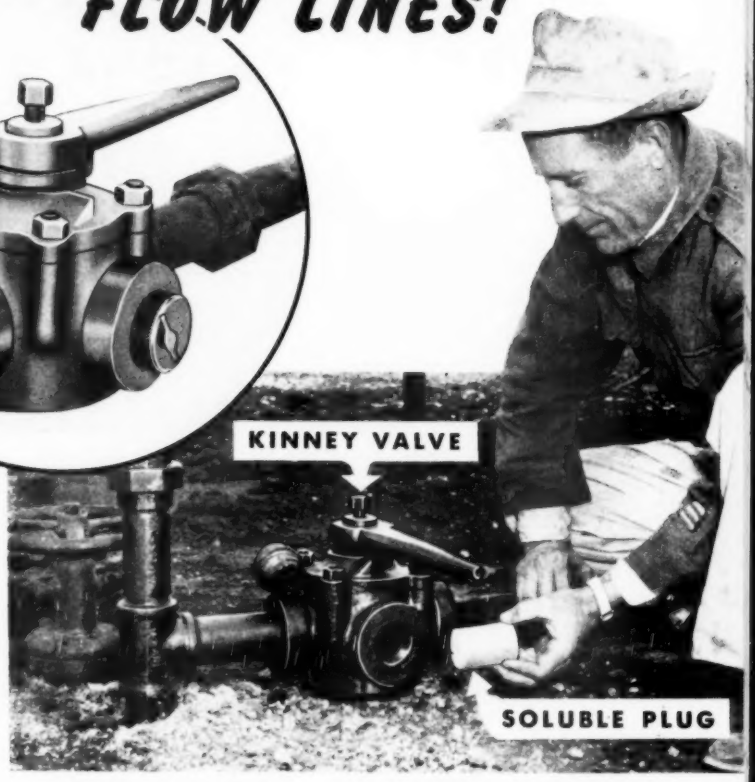
AND CLEANS PARAFFIN AS IT MOVES

COMPLETELY DISSOLVES WITHIN FEW HOURS



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Socony-Vacuum adviser with Deutsche Vacuum Oel, A. G., a Socony-Vacuum subsidiary.

Robert S. Cooke, petroleum engineer at Tulsa for Carter Oil Co., has been appointed assistant division engineer at Mattoon, Ill. Other changes include: **John H. Adams** and **Henry A. Bourne,** named engineers at St. Elmo, Ill.; **Frank B. McWilliams,** named engineer at Seminole, Okla.; **J. M. Powell,** engineer at Council Grove, Kans., transferred in a similar capacity to Brazil, Ind.; **Paul E. Schauer, Jr.,** engineer at St. Elmo, Ill., transferred to Mattoon, Ill.; and **Joseph S. Bottler, Jr.,** engineer at Mattoon, moved to Tulsa in that capacity.

William Storck, Roselle Park, N. J., shift engineer at Tide Water Associated Oil Co.'s Bayonne, N. J., refinery, has been appointed foreman.

Jack Fulton, Pure Oil Co., has been elected president of the newly organized Billings, Mont., Geological Society. Others elected include: **Tom Barnes,** Shell Oil Co., vice president; **George Darrow,** Amerada Petroleum Corp., secretary; **James Vine,** U. S. Geological Survey, treasurer; **Charles Content,** Bureau of Reclamation; **Art Hornung,** independent geologist; and **George Summers,** Pure Oil Co., named to the executive committee.

Edwin J. Barth, petroleum technologist, has joined Gulf Oil Corp., at Pittsburgh, as technical consultant in the general sales division.

Charles G. Wilson, formerly production engineer at Cabimas Estado Zuela, Venezuela, has returned to the United States and is now in Chicago where he is serving as a consulting geologist.

W. S. Lentz, production and drilling engineer for Warren Oil Corp. at McLean, Tex., has been transferred in a similar capacity to the Panhandle division, with headquarters at Kellerville, Tex.

Harlan H. Yoakam, consulting geologist, Sinton, Tex., has joined the Delta Gulf Drilling Co. at Tyler and Dallas. Yoakam, who formerly was with Plymouth Oil Co. at Corpus Christi, before opening his own offices, will be located in Midland.

John R. Sherman, district gas engineer at Fort Worth for Gulf Oil Corp., has been transferred to Pittsburgh as staff assistant, executive department, on gas and gasoline matters. **J. W. Cole, Jr.,** Houston, has been moved to Fort Worth to succeed Sherman.

Joseph Neeley, district geologist for Magnolia Petroleum Co. at Mount Vernon, Ill., has been transferred to company headquarters in Dallas, and will be replaced at Mount Vernon by **Jeff Saline.**

Ivian A. Parmer, district superintendent in West Texas for Conorado Oil Co., Tulsa, with headquarters in Lefors, has been transferred to Elk City, Okla., where he is serving as division superintendent for Oklahoma, Texas, and Kansas.

W. R. Remalia, formerly with the research department of Standard Oil Co. (Ind.), Chicago, has been appointed manager of the economics department of Pan-Am Southern Corp., New Orleans. A graduate in chemical engineering from Carnegie Institute of Technology, Remalia has specialized in refinery technical-service work. At the time of his appointment with Pan-Am Southern, he was engaged in economic studies involving refinery operations, holding the position of senior coordinating analyst in the distribution economics department of Indiana Standard.

Olin Culberson, member of the Texas Railroad Commission, has announced that he is a candidate for governor of the State of Texas in the forthcoming election.

Harold Denton, Sun Oil Co., Beaumont, Tex., has been elected chairman of the southwestern district, division of production, American Petroleum Institute, succeeding **E. B. Miller, Jr.,** Tide Water Associated Oil Co., Houston. **E. C. Patton, Jr.,** Magnolia Petroleum Co., Dallas, was named secretary-treasurer, succeeding **R. E. Heithecker,** Seaboard Oil Co., Dallas. The following district vice chairmen were named: **Frank Wood,** Wichita Falls, for North Texas; **Phil Lehnhard,** Kilgore, for East Texas; **Olin G. Bell,** Houston, for Texas Gulf Coast; **William D. Lane,** Midland, for West Texas-New Mexico; **Frank B. Lefevre,** San Antonio, for Southwest Texas; **J. H. Rambin,** New Orleans, for South Louisiana; and **Hardy Moore,** Shreveport, for North Louisiana.

Dr. L. L. Nettleton, Houston, will represent the Society of Exploration Geophysicists at the forthcoming Third World Petroleum Congress, to be held at The Hague, The Netherlands, May 28-June 6, 1951.

Irving Frazier, The Texas Co., has been named chief scout in California and will be assisted by **Yale Langworthy,** of the San Joaquin Valley division, and **Roy Stark.**

H. D. Collier, retired chairman of the board of directors, Standard Oil Co. of California, has been named

FOREIGN GUESTS at the February meeting of the New York chapter of Nomads include the group shown here. Front row, left to right, are Paul W. Brower, Socony-Vacuum Oil Co., Bogota, Colombia; F. Padilla, Petroleos Mexicanos, Mexico City; Tom Conger, S.V.P.M. (Standard Vacuum), Palembang, Sumatra; and E. Fabres, Corp. de Fomento, Santiago, Chile. Back row: C. A. Garcia, Petroleos Mexicanos, Mexico City; L. A. Messone, Elmer Weiss, and Alberto Landoni, all with Yacimientos Petroliferos Fiscales, Buenos Aires, Argentina; J. W. Deschamps, Hughes Tool Co. and Lucey Export Corp., Buenos Aires; and F. Blanco, Direccion General del Gas del Estado, Buenos Aires.

PERSONALS

chairman of the American Cancer Society's 1950 educational and fund-raising drive in California.

A. W. Breeland, safety director for Lone Star Gas Co., Dallas, was elected president of the Texas Safety Association at the eleventh annual meeting of that organization at Dallas recently.

G. R. Brown has taken over new duties as district petroleum engineer at Midland, Tex., for The Texas Co., succeeding **H. D. Murray**, who resigned to enter private business. Brown formerly was on the North Texas district staff at Wichita Falls. **M. C. Peck** has been named chief clerk, Midland producing department, succeeding **W. E. Chapman,** who resigned.

T. A. Morgan, general superintendent of the Houston Industrial Gas Corp., has resigned his position to devote full time to the presidency of the Gulf Coast Pipe Coating Corp. A professional engineer, Morgan has served with a number of Texas gas companies since he began his career in 1926 as field engineer for the Houston-Gulf Gas Co., which is now United Gas Corp.

William R. Marshall, general manager of Atlantic Oil Storage Co., Antwerp, Belgium, has been made a Knight of the Order of Leopold I, in recognition of services rendered to the Belgian economy.

***GETS SERVICE BUTTON.**—B. B. Howard, left, member of the board of directors, Standard Oil Co. (N. J.), is shown receiving his 30-year service button from Frank W. Abrams, chairman of the board. He served as general manager of the company's marine department before being named director in 1945.*

J. J. Brown, tool pusher at Delano, Calif., for Rocky Mountain Drilling Co., is now serving as rig-up foreman at Bakersfield, Calif.

Paul S. Pustmueller, formerly with Shell Oil Co. as geologist, is now associated with the Fremont Petroleum Co. of Wyoming.

SHIFTS

Norman Newsome, engineer, Humble Oil & Refining Co., Genoa, Tex., to Houston; **R. C. Mills, Jr.,** geologist, Standard Oil Co. of Texas, Midland to Abilene, Tex.; **G. A. Kearney,** superintendent, California Oil Co., Good Hope, La., to Chicago; **J. B. Payne,** superintendent, Humble Oil & Refining Co., New Iberia, La., to Beaumont, Tex.; **D. C. Seely,** engineer, Socony-Vacuum Oil Co., Inc., Little Neck to New York City; **J. W. Workman,** superintendent, Humble Oil & Refining Co., Monroe City to Genoa, Tex.; **V. A. Cain,** superintendent, George E. Farley, Penwell to Winters, Tex.; **Joseph R. Ault,** engineer, Carter Oil Co., Tallulah, La., to Canton, Miss.; **C. A. Hansen,** engineer, Humble Oil & Refining Co., New Orleans to Midland, Tex.

J. D. Creveling, engineer, Panhandle Eastern Pipe Line Co., Chicago to Tulsa; **C. D. Guttersen,** engineer, The Texas Co., Lawrenceville, Ill., to St. Paul; **C. E. S. Bellows, III,** geologist, The Texas Co., Mount Pleasant, Mich., to Midland, Tex.; **Walter A. Tallon,** geologist, Stanolind Oil & Gas Co., Pittsburgh to Vicksburg, Miss.; **A. M. Sullivan,** engineer, Carter Oil Co., Cut Bank to Lewistown, Mont.; **Ray Sing,** superintendent, Gabe McCall Drilling Co., Lander to Casper, Wyo.; **H. C. Dye,** superintendent, Rocky Mountain Drilling Co., Newhall to Redondo Beach, Calif.; **George William Hyland,** superintendent, Production Maintenance Co., Rosenberg to Wharton, Tex.

David B. Meisenheimer, engineer, The Texas Co., Odessa, Tex., to Fort Worth; **W. K. Arbuckle,** engineer, British-American Oil Producing Co., Taft to Rosenberg, Tex.; **C. H. Austin,** Montex Drilling Co., Brownfield to Snyder, Tex.; **R. M. Graves,** engineer, Cities Service Gas Co., Pampa, Tex., to Satanta, Kans.; **Bernard F. Carr,** engineer, Atlantic Refining Co., Maryville, La., to Dallas; **Robert Davenport,** engineer, Amerada Petroleum Corp., Lamar, Colo., to Logansport, La.; **Cruce Dunnam,** superintendent, Midwestern Drillers, Hugoton to Liberal, Kans.

DEATHS

Marion Emmons, 62, former operator of Mid-Land Torpedo Co., died in Lubbock, Tex., March 8. Emmons worked for the British Government in England, India, Burma, China, and Canada, and for a time resided in Liverpool, England, where he supervised drilling of oil wells in that country.

C. M. Wanbaugh, 81, with Sun Oil Co. for 55 years, died in Gladwin, Mich., March 6. At the time of his death he was drilling-tool foreman in the Gladwin district.

R. M. Bunyard, 59, former oil and gas-lease broker, died in Tahlequah, Okla., March 2.

James A. Johnson, retired New Orleans and Beaumont, Tex., oil man, died in Beaumont February 26.

Clarence M. Campbell, 72, Tulsa pioneer oil man, died March 9.

Ben K. Stroud, 68, pioneer in California oil-field development, died in Los Angeles, March 2.

Lora L. Hall, 74, retired oil man, died in Muskogee, Okla., March 8.

Dr. Eduardo Lopez, former head of Cia. Unidas de Petroleo, died recently in Colombia. Lopez had been prominently identified with the Colombian oil industry for a number of years, both as a government and company official. Cia. Unidas is the now inactive subsidiary of Sinclair, Cities Service, and Richfield.

Lawson Bales, 66, retired Texas Co. production superintendent, Humble, Tex., died March 8.

Stanley Burt Carver, 42, superintendent of Seaboard Oil Co.'s Luby camp, died March 8 at Corpus Christi, Tex.

Fred A. Watkins, 57, with Cities Service Oil Co. for 32 years, died in Lake Charles, La., March 4.

Robert J. Allen, 57, member of the purchasing-department staff, Esso Standard Oil Co., New York, died in Cranford, N. J., March 5.

George Milton Canterbury, 82, retired Tulsa oil man, died March 13. He at one time was with the old McMann Oil Co., and the Gypsy Oil Co.

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Chemical Deterioration of Cooling-Tower Lumber

by C. L. Blohm and H. D. Frazier

THE employment of cooling towers in the process industries for the dissipation of mass heat loads has been of general practice for many years, and this practice has been quite satisfactory from the standpoints of operation and economic considerations. However, such towers, when constructed of wood, are subject to certain types of deterioration, among which are chemical and bacterial attack, attack by other living organisms, such as the teredo and similar wood-chewing insects, and fouling of the structure by algal growths. This paper will discuss chemical deterioration as involved in the failure known as "delignification."

Very briefly, wood consists structurally of a series of hollow cells surrounded by the cell walls, adjacent cell walls having a common medial layer known as the middle lamella.[1] This common layer serves to cement the cells together and probably is largely responsible for the strength characteristics. The cell walls themselves consist of two generally distinct kinds of material, cellulose and lignin, and the cell cavity contains the so-called extraneous materials of wood consisting of sugars, salts, oils, resins, etc. These latter probably have little bearing on the subject under discussion. Rather extensive investigations into the composition of the cell wall and middle lamella indicate that the latter consists to a large extent of what is commonly classified as lignin.

While the structure of lignin itself has never been very thoroughly clarified, it is known to consist of certain general chemical groups and is classified analytically as the wood material soluble in strong caustic or bisulfite solutions as contrasted with the cellulose which is soluble in acid solutions. In wood chemistry the term "delignification" is meant to describe the removal of alkali or bisulfite soluble matter. Since such material is that which is largely responsible for the strength of the wood, it is probably proper to apply this terminology to the structural failure of cooling-tower lumber resulting from dissolution of lignin.

However, the process as it operates in destroying a cooling tower is probably more complex than the simple procedure used in making wood analyses, since there are mechanical and other effects involved which will be discussed below. Delignification in cooling towers results finally in leaving the wood residue as a fibrous cellular structure of extremely low strength. In extreme cases this residue is probably largely cellulose. In one observed instance of cooling-tower failure, large quantities of pure white, short cellulose fiber were recovered from completely plugged pump and basin weir screens after severe and rapid delignification had occurred. In such advanced cases, the

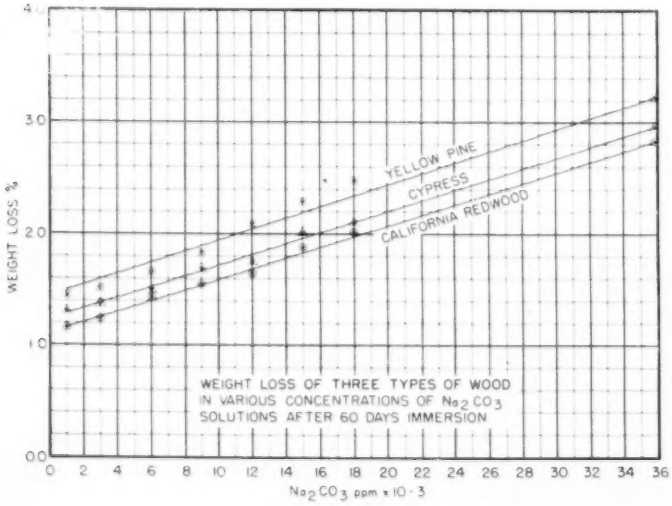


Fig. 1

The Authors

C. L. BLOHM

H. D. FRAZIER

Clyde L. Blohm is assistant director of research and development, The Fluor Corp., Ltd. Blohm is a graduate of California Institute of Technology, receiving his B.S. in 1930 and his M.S. in chemical engineering in 1931. He joined Fluor in 1942. Under his supervision, research has covered a large number of problems, such as desulfurization and dehydration of hydrocarbon gases, studies of hydrocarbon hydrates, corrosion resistance of metals, evaporative water cooling, general wood chemistry as applied to cooling towers, and development of equipment such as Fluor pulsation dampeners, gas cleaners, mufflers, etc.

Henry D. Frazier since 1944 has been engaged in research for Fluor on acid-gas separation and dehydration processes for natural gas and gasoline. Frazier was graduated from University of California in 1940, spent 3 years in the gas division of Shell Development Co., and 2 years with Consolidated Engineering Corp. before joining Fluor.

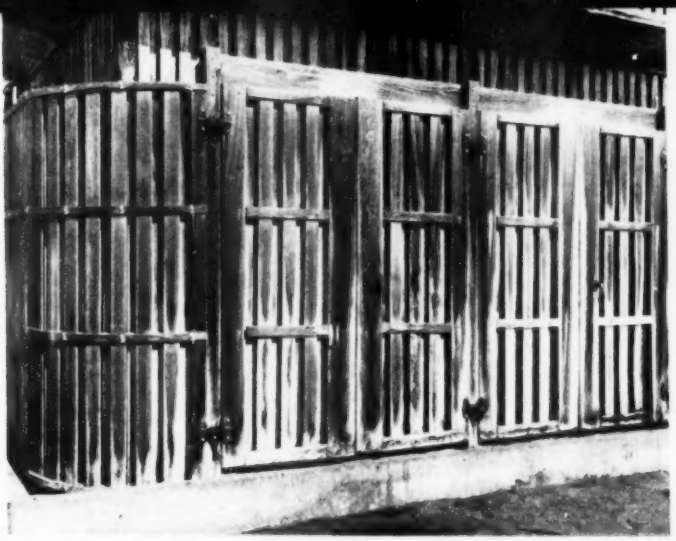


Fig. 2—Cooling-tower shed doors in initial stages of delignification. Note accumulated salts and some feathering on bottoms and edges of batts.

fact that the loose cellular structure will not hold nails or properly support other fastenings precludes almost any reasonable repair method other than complete replacement of the failed members.

Thus, it may be seen that in installations where delignification can occur in a cooling tower, the resultant damage is of considerable concern to the tower owner, since expense is incurred not only in repair of the damage, but may in addition result from disruption of plant operation. The above discussion should not imply that the phenomenon of delignification occurs in all cooling towers, but the occurrence is of sufficient frequency to warrant the interest of all persons concerned with the use of such equipment.

In the light of the preceding considerations, information of considerable value could be obtained from investigation into the causative factors involved in delignification and into means for inhibiting or completely preventing such occurrence. To this end a survey and laboratory investigation[2] were conducted in an attempt to evaluate some of the factors involved.

Over 500 Cooling Towers Studied

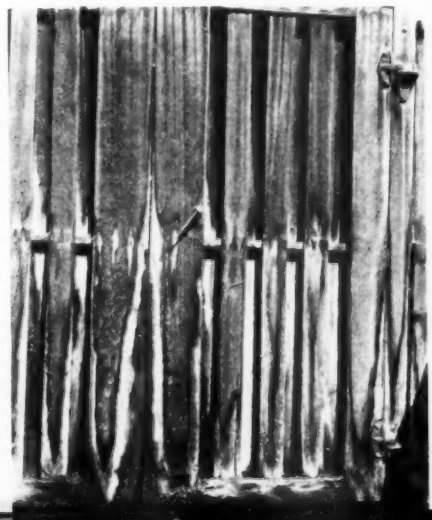
The survey consisted of the examination of over 500 cooling towers, covering an area of approximately 2 million square miles in the Pacific Coast and Mid-Continent regions. While it was not possible in many cases to obtain sufficient long-time data to enable accurate conclusions to be drawn, complete reports were obtained on a total of 153 towers, and, in general, the remaining towers indicated the same basic factors as were evidenced in the 158 recorded reports. A survey of the data accumulated indicated the possibility that the presence of sodium carbonate in the water might be a principal factor in effecting delignification.

On the basis of the survey findings indicated above, laboratory experiments were initiated to provide further evidence. These experiments were conducted on three types of wood commonly employed in cooling-tower construction: California redwood, cypress, and yellow pine. Samples of each were prepared of approximately the same size and weight and these were dried in an oven at 95° C. for 48 hours before final weighing. The specimens were then placed in the test solutions and allowed to steep for 60 days, after which the specimens were removed and thoroughly washed in distilled water, the washings being returned to the original solutions. Finally, the samples were again dried at 95° C. for 48 hours and weighed, and the weight change was recorded as per cent loss of the original weight.

The test solutions were analyzed for total extract content and within the limits of error of the experiments the weights of the extracts equaled the loss in weight of the test specimens. Table 1 and Fig. 1 give the results obtained.

In order to test the presumption that sodium carbonate was a principal causative factor in delignification, the first eight test solutions used contained increasing amounts of this salt and no other. Since, in concentrations of 1,000 p.p.m. and greater, the pH of such solutions is essentially constant, this series of tests gives a direct correlation between weight loss and the effect of sodium carbonate concentrations independent of pH. Inspection of the tabulated data and the curves in Fig. 1 indicates that the loss in weight is approximately linear with increasing sodium car-

Fig. 3—(Left) Detailed view of further progress of delignification in coil shed doors. Note salts accumulation and exfoliation. Fig. 4—(Right) Considerably more advanced stages of aerator structure showing the total destruction of a few batts in the bottom half.



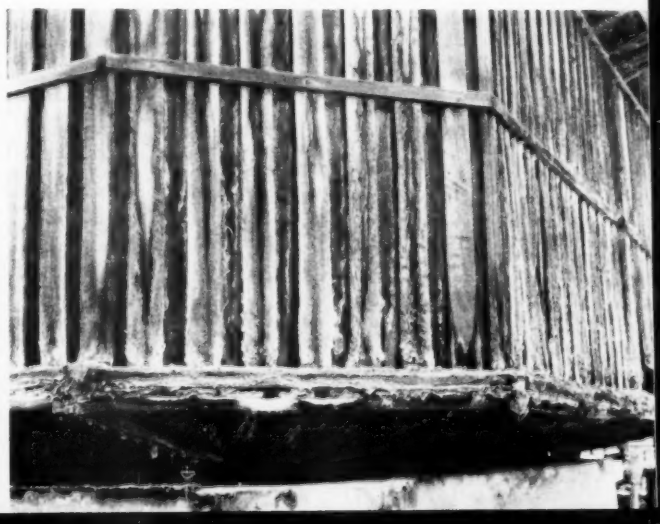


Fig. 5—(Left) Serious destruction of batting with heavy salt accumulation and extensive feathering and exfoliation. Fig. 6—(Right) Drip panels and aerators in a dangerous state of destruction by delignification. Here relatively small forces will break through the remaining wood. Note "ropey" appearance.

bonate concentrations above 1,000 p.p.m. Unfortunately, distilled water brought to the same pH, but with zero sodium carbonate content, was not utilized for a comparative base, and, therefore, one cannot predict the shape of the loss curve between the origin and 1,000 p.p.m. abscissa.

Further inspection of the tabulated data indicates that high concentrations of neutral salts have little effect in promoting delignification as long as the pH of the solution is kept between 7.0 and 7.5. Under acid conditions there is some wood destruction which cannot be classified as delignification but becomes appreciable as the pH drops to 5.0 or lower. Finally, inspection of the experimental data indicates that California redwood has somewhat greater resistance to delignification than the other woods employed.

While it is unlikely that one would ordinarily encounter salt concentrations in cooling waters as high as 36,000 p.p.m., it is possible to attain such concentrations in localized areas where salts have accumulated due to evaporation. Examination of the reported data on the inspected towers indicates that delignification is excessive in such localized areas and, in general, considerably greater than in the tower areas which are continuously washed by the circulating water. In the light of this observation, it is indicated that prevention of such salt accumulation by periodic washing of the affected areas would contribute considerably to prolonged tower life, and this would be true even in installations in which the circulating water itself is deleterious.

Since the tests conducted with the sodium carbonate solutions were all at essentially the same pH, it is not possible to predict the effect of pH on the rate of delignification, although increasing pH could be used as a qualitative index of possible difficulty; however, the wood chemistry involved is somewhat complex. Although caustic solutions are commonly employed for effecting delignification of wood in the preparation of paper pulp and other operations, these solutions are usually fairly concentrated. Redwood tanks have been employed in several instances for the storage of dilute caustic solutions in concentrations up to 3 per cent for periods of several years without any noticeable deterioration. The pH of such a solution would be between 13 and 14, so it is seen that pH alone is not a criterion of delignification. On the other hand, concentrated sodium carbonate solutions are not well handled in redwood tanks, and thus it is apparent that sodium carbonate seems to have a specific action in delignification processes, since the pH of even a concentrated sodium carbonate solution cannot exceed about 11.5.

Nevertheless, in cooling-tower operation, high pH in the water is nearly always due to accumulation of sodium carbonate, since free hydroxide is seldom encountered; therefore, it is possible to utilize the simple measurement of pH in the water as a qualitative indication of probable delignification resulting from carbonate accumulation. Finally, there is undoubtedly a further contributing factor in the areas in which salt encrustation is allowed to occur: any liquid phase in contact with such encrusted salts is necessarily saturated and such saturated solutions will tend to soak into the wood to some extent. On subsequent drying of the area involved, the salts are left behind and may decrepitate due to loss of water of hydration, resulting in rupture of the cell membranes, or, on repeated re-

TABLE 1

Sample	Solution—	pH	Per cent loss in weight— Redwood	Cypress	Yellow pine
1	1,000 p.p.m. Na_2CO_3	10.94	1.16	1.32	1.46
2	3,000 p.p.m. Na_2CO_3	10.94	1.24	1.38	1.53
3	6,000 p.p.m. Na_2CO_3	10.95	1.46	1.52	1.66
4	9,000 p.p.m. Na_2CO_3	10.95	1.56	1.69	1.84
5	12,000 p.p.m. Na_2CO_3	10.95	1.64	1.76	2.09
6	15,000 p.p.m. Na_2CO_3	10.95	1.89	2.02	2.29
7	18,000 p.p.m. Na_2CO_3	10.95	2.02	2.11	2.48
8	36,000 p.p.m. Na_2CO_3	10.95	2.84	2.97	3.23
9	36,000 p.p.m. NaCl	7.49	0.21	0.22	0.42
10	36,000 p.p.m. Na_2SO_4	7.51	0.18	0.17	0.39
11	36,000 p.p.m. $MgSO_4$, $CaSO_4$	7.2	0.15	0.16	0.39
12	36,000 p.p.m. NaCl, $CaSO_4$, $MgSO_4$	7.4	0.11	0.09	0.38
13	24,000 p.p.m. HaCl, $CaSO_4$, $MgSO_4$ plus H_2SO_4	5.01	1.22	1.20	1.99
14	H_2O plus H_2SO_4	4.50	1.48	1.53	2.06
15	24,000 p.p.m. mixed salts plus H_2SO_4	7.20	0.08	0.09	0.32

hydration, may swell, again causing cell rupture. Either of these occurrences results in a type of exfoliation which gives the wood a rough, stringy appearance, and, furthermore, continually presents fresh surface for either repetition of the same occurrences or dissolution of more lignin by concentrated sodium carbonate solution. In any event, however, the attack appears to be considerably increased in the presence of sodium carbonate as contrasted with the mechanical action due only to the accumulation of neutral salts.

Of all the salts commonly occurring in cooling-tower waters, sodium carbonate is unusual in its ability to cause this type of mechanical destruction. This salt has three different hydrate forms in addition to the anhydrous form, a complex of sodium carbonate and sodium bicarbonate and water, and, in addition, the possible conversion to sodium bicarbonate. This makes a total of six relatively common forms, all of which have different crystal structures and any one of which may be converted to any other by changes of temperature and available water.

Control of pH Extremely Important

Since the conclusions drawn above indicate the undesirability of sodium carbonate in cooling-tower waters, the most obvious recommendation would be the elimination of this salt from the system. Investigation has indicated that sodium bicarbonate itself has little effect in promoting delignification; however, bicarbonate ion is readily converted to the normal carbonate due to the increased temperature of the influent circulating water and its aeration. For this reason it is obvious that pH control is of extreme importance in carbonate hard waters, since the carbonate to bicarbonate ratio increases with increasing pH and at values of 9 or higher most of the hardness is in the form of normal carbonate. This means then that it is not necessary to remove the carbonate completely by means of ion exchange or other treatment, but it is necessary to maintain the carbonate in the bicarbonate form, a requirement that is satisfied by keeping the pH of the water between 7.0 and 7.5. Sodium zeolite treatment of carbonate hard circulating waters may lead to rather high concentrations of sodium carbonate and if such a treating method is used it is imperative that proper pH control be maintained as otherwise sodium carbonate concentrations can easily become excessive.

Since it has been pointed out that the presence of neutral salts in the water does not contribute appreciably to delignification, other treating methods probably can be used with reasonable safety provided again, however, that pH is properly controlled. Since treating of the water is employed primarily for the protection of mechanical equipment, it is unlikely in most cases that pH of less than 7.0 will be encountered, since acid waters in general are not suitable for use in contact with most structural metals. However, it is realized in some instances that inhibited waters of pH as low as 6 are sometimes used in circulating systems. This practice is probably reasonably safe although, in general, it would be well to keep the cooling tower water pH value greater than 6.5.

Excessive Chlorine to Be Avoided

One rather special incident of apparent delignification is of some interest. In the operation of this particular tower some waste chlorine was injected into the tower water as a convenient means of disposal, since chlorination is commonly used in any event for algae control. However, the residual chlorine content of this water was allowed to go as high as 60 p.p.m. and under these conditions destruction was quite rapid in the cooling-tower decking, although the other conditions of the water, that is, pH and sodium carbonate content, were reasonably satisfactory. This observation would indicate that excessive chlorine concentrations should be avoided and that in general oxidizing materials should not be permitted to accumulate in any circulating water.

In this connection, it might be well to point out that a cooling tower and its circulating water should never be used for disposal of waste materials, except in very special cases. In the event that such a practice must be resorted to, more than routine control should be maintained on such a tower in order to determine the effects of such contaminants. Since, in regions in which water is scarce, it is a sufficiently difficult job to maintain the cooling-tower water in proper condition, such difficulties should not be aggravated by the addition of further contaminants.

As to the prevention of delignification, the following comments and recommendations may be made. Unfortunately, in many instances a cooling tower is not given nearly as much care and attention as is commonly employed in the maintenance of mechanical equipment, and yet such a tower is an important part of a processing plant and represents a considerable capital investment. The most important means of prolonging tower life is proper control and maintenance, and such care should consist first of control of the water for sodium carbonate content and pH. These two factors are interdependent, however, to a considerable extent, since control of pH between 7.0 and 7.5 automatically limits the normal sodium carbonate content to a low value. Furthermore, as pointed out previously, delignification is nearly always greatest in nonoperative sections of the cooling tower which are located such that they undergo alternate wetting and drying with consequent accumulation of salt encrustations.

The five illustrations (Figs. 2-6) accompanying this article show pictorially the progress of typical delignification in these nonoperative tower sections. Periodic hosing or other cleaning of aerators and structural members would serve in large part to eliminate this factor, and such treatment can be effected while the tower is in operation. In the event of cessation of tower operation as a result of general maintenance or repair shutdowns, inspection of the tower should be made and all sections properly cleaned if necessary.

In a search for other preventive methods, some rather cursory field investigations were made on the use of protective materials. Preliminary results indicated that sections treated with materials which reduce the transfer of sodium carbonate containing water through the wood structure exhibited some increased resistance to delignification.

In some instances in the past, painting of nonfunctional members has been employed with some success, provided the painting is properly maintained, since most paints do not stand up too well under the conditions found in cooling-tower operation, and thus have to be renewed at intervals. However, good aluminum paint seems to provide effective protection, requiring only occasional replacement. If painting is employed, some care must be taken to prevent the accumulation of salt encrustation on the painted areas, since such is quite destructive to these coatings.

In a few instances, cooling-tower lumber has been impregnated with oil or with other water repellants with some success; however, the practice has certain disadvantages, a specific one of which is to increase fire hazard considerably. Finally, any such impregnation or coating procedure can only be applied to nonoperative sections of the tower, since any attempt to impregnate the distribution decking itself results in such gross alteration of the active evaporative surfaces as to reduce the tower efficiency materially. Furthermore, the use of any water repelling agent will result in channeling of the water flow, an occurrence which directly defeats the purpose for which the tower was originally constructed, since a tower's prime function is to effect good water distribution and adequate air-to-water contact. Thus, it is seen that while certain means may be taken to prevent delignification of parts of the tower structure, protection of the operating sections can be attained only by suitable control of the circulating water.

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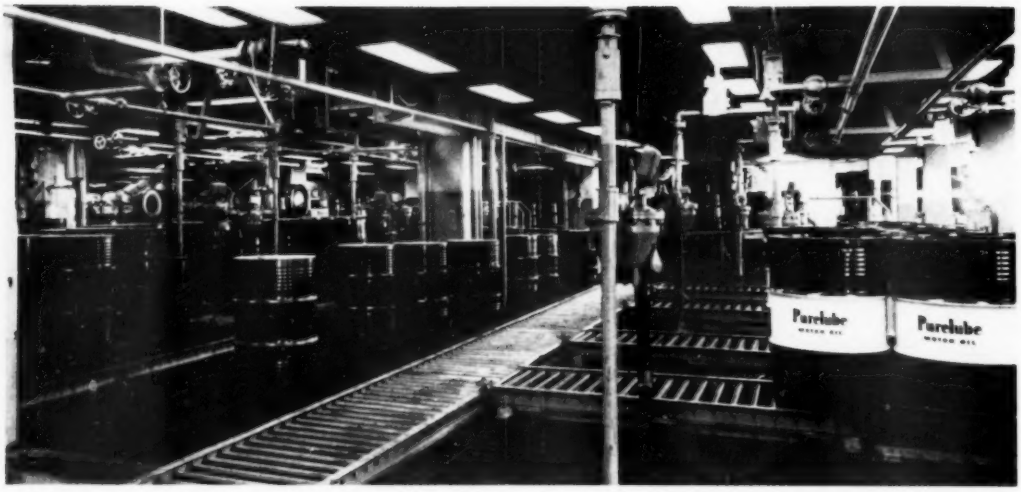


Part of packaging department in Pure Oil Co.'s new grease, compounding, and blending plant, at its Smiths Bluff refinery near Nederland, Tex.

New G.C.B. Plant Provides Pure Oil With Modern Lube-Manufacturing Facilities

by L. B. Stevens

IN early summer of 1949 Pure Oil Co. finished construction of its new grease, compounding, and blending plant at its Smiths Bluff refinery, located near Nederland, Tex. This event marked the virtual completion of a program which provided the refinery, for the first time in its 25 years of existence, with comprehensive facilities for the manufacture of lubricants. Besides the grease, compounding, and blending plant, new facilities include a steam-generation plant, atmospheric and vacuum-distillation units, deasphalting and solvent-extraction equipment, a methyl ethyl ketone dewaxing and contact filtration plant and, in order adequately to handle the augmented output of the refinery, a new 1,200-ft. concrete wharf.

The grease, compounding, and blending plant, commonly called the G.C.B. plant, had been under consideration by Pure Oil for several years. Ample time was therefore available for development of plans by Pure's engineering and technical staffs. At an early stage in planning, it was decided to depart from what has often been a common practice in the industry; namely, that of handling grease manufacture, compounding, and blending, and sometimes even packaging, as entirely separate activities, each housed in its own building and each with its own accessory equipment and its own complement of personnel.

L. B. Stevens is assistant superintendent, lube and grease division, Smiths Bluff Refinery, Pure Oil Co. Born in Massachusetts, Stevens did his undergraduate work at Dartmouth College, receiving a degree in chemistry in 1927. He also received an advance degree in chemistry from New York University. From 1928 to 1935 he worked on grease research for the Texas Co. and after a short time with Tide Water joined Pure Oil Co. as superintendent of grease manufacture at Marcus Hook, Pa., in 1935. He operated that plant until 1949 when he took over his present duties at Smiths Bluff. In addition to operating the plant at Marcus Hook he assisted materially in the design of the new facilities at Smiths Bluff described in this article.

It was felt that the integration of activities into one coordinated whole would make possible a considerable saving in construction as well as in operating expenses. In taking this step it was definitely not a matter of seeking the easy way out because many new problems arose which had to be dealt with. These were, nevertheless, met and overcome with a result that Pure now possesses a plant which it considers unique in the industry both in respect to design and to operating efficiency.

Physical equipment of the G.C.B. plant includes a two-story manufacturing and packaging building, 264 by 154 ft. in size; a contiguous warehouse, 280 by 154 ft., used for storage and shipping of packaged materials; platforms and loading racks of sufficient size to permit handling of about 30 box and tank cars simultaneously; and a tank farm covering an area of over 3 acres containing 56 tanks with capacities ranging from 50 to 10,000 bbl.

The purpose of the plant is, of course, to manufacture, package, and ship the various greases, compounded oils, and blended oils required by the company's marketing outlets. These include complete lines of motor, aviation, and industrial oils and greases, which got out in an excess of over 1,000 forms and varieties.

In the material, or ingredient category, some 80 different items are used, while the different types and styles or packages total about 20. Empty packages are ordinarily received from the can or drum manufacturer in box cars. These cars are unloaded via special conveyors located along the box-car unloading platforms. Containers of drum size

move to a storage space on the first floor, while empty cans and pails move to a similar area on the second floor of the main building. Frequently it is possible to move the empty packages directly to the filling locations, thus avoiding storage and double handling.

Ingredient material is received and stored in several different ways. Naturally, by far the greater bulk of these items originates in the adjacent lube plant so storage of these oils is simply a matter of pumping them to appropriate tanks via pipe line, separate lines being available for the different classes of oil. The storage tanks are equipped with low-pressure heater coils in order that they may be maintained at optimum pumping temperature without the contents suffering from a quality standpoint. Special equipment is also available to control the breathing of the tanks. With the heavy rainfall, rapid changes in temperature and the normally humid atmosphere characteristic of the Gulf Coastal region, moisture free storage of lubricating oils becomes somewhat of a problem. This condition is, however controlled by means of an air drier which maintains a few ounces pressure of relatively dry air upon the storage tanks and its contents.

Certain other ingredients are stored in tanks. These include several types of fat, chemicals and special additives, and a few grades of lubricating oil not presently being manufactured in the refinery. Products of this nature are received in tank cars and are unloaded into storage by means of special pumps located at the tank-car loading and unloading rack. Still another class of ingredient includes the numerous list of miscellaneous chemicals and additives. Most of these are packaged in drums, bags, or cartons and are received by means of motor freight or box car. Upon receipt such materials are usually stacked on pallets and are stored in a second-floor area convenient to manufacturing operations. Dry chemicals and similar components, stored on pallets, are moved by fork truck to scales and thence to the appropriate kettle or mixer. Fats and other liquid chemicals which are stored in the tank farm are pumped to the building, collected in portable weigh tanks, and transported by fork truck to their destinations.

Lubricating-oil stocks are moved to manufacturing operations in the building in a rather unusual manner. Individual pumps, in many cases several of them, take suction from the various tanks near which they are located. Independent discharge lines are led to a central point in the tank farm when they are elevated into a bridge and conducted into a pipe bay on the second floor of the manufacturing building. From this point the oils are fed through meters to the various manufacturing units. Pumps are of the variable-volume type with internal bypasses, and their motors may be controlled remotely from panel boards located adjacent to manufacturing operations. In this manner contamination is practically eliminated and the use of intermediate tanks is avoided. This latter consideration was of considerable significance in Pure's case since, due to unfavorable subsoils, it was of considerable economic advantage to reduce building loads as much as possible.

Products now being manufactured at the grease, compounding, and blending plant vary in complexity from simple mixtures of two lube stocks to greases containing perhaps as many as a dozen different ingredients. In order to simplify to some extent a conditions which at best was somewhat complicated, it was necessary to group the various products into several classifications, the members of which were similar to each other within rather broad limits. Study during the design stage indicated that the entire range of products could thus be divided into 12 classifications. Members of each category might vary rather considerably amond themselves in properties but not so much so that manufacturing equipment could not be designed to encompass all members of the group. This division into classifications was the origin of the different manufacturing units employed in the plant.

The different units and their principal purpose are outlined as follows:

Unit 1—Manufacture of calcium soap greases;

Unit 2 — Manufacture of sodium soap greases;

Unit 3—Manufacture of extreme-pressure bases;

Unit 4—Manufacture of gear shield and wire-rope greases;

Unit 5 — Manufacture and compounding of cutting oils;

Unit 6 — Manufacture of water-pump grease;

Unit 7—Manufacture of wool yarn and similar greases;

Unit 8—Manufacture of axle grease;

Unit 9—Manufacture of compounded oils;

Unit 10—Manufacture of gear oils;

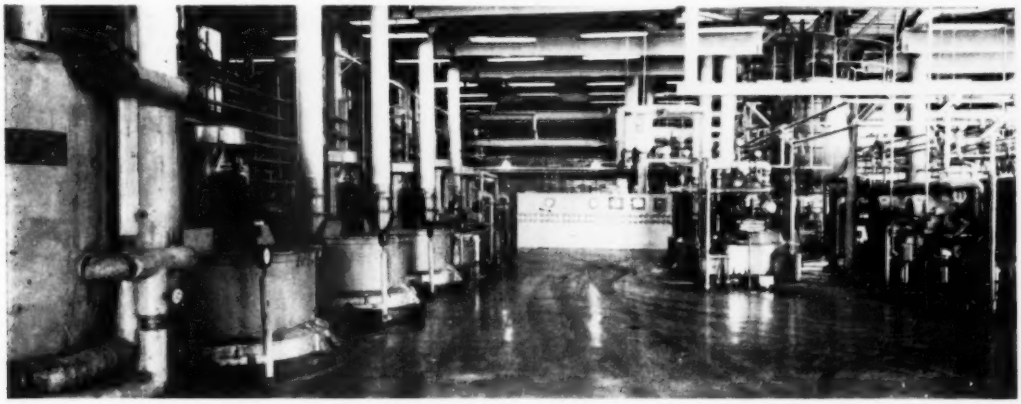
Unit 11—Blending of black oils; and

Unit 12 — Blending of motor and clean industrial oils.

Unit 1 consists of a pressure saponification autoclave and several conventional scraper-agitator type grease kettles. Fat charges are weighed into portable scale tanks which are transported to their destinations by means of fork trucks. Oils are delivered to the kettles through meters located in the near by pipe bay. Unit 2 is similarly constructed but, due to the special requirements of sodium soap grease manufacture, very sturdy agitators are employed. Kettles in Unit 2 are driven by variable-speed steam turbines in order to make available the peculiar type of agitation considered necessary for soda soap grease preparation; all other kettles are driven by electric motors.

Units 3, 5, and 9 consist of groups of kettles of varying size. Their pur-

(Continued on page 104)



Grease kettles at grease, compounding, and blending plant. Panel board at rear controls pumps in tank farm which supply materials to kettles.

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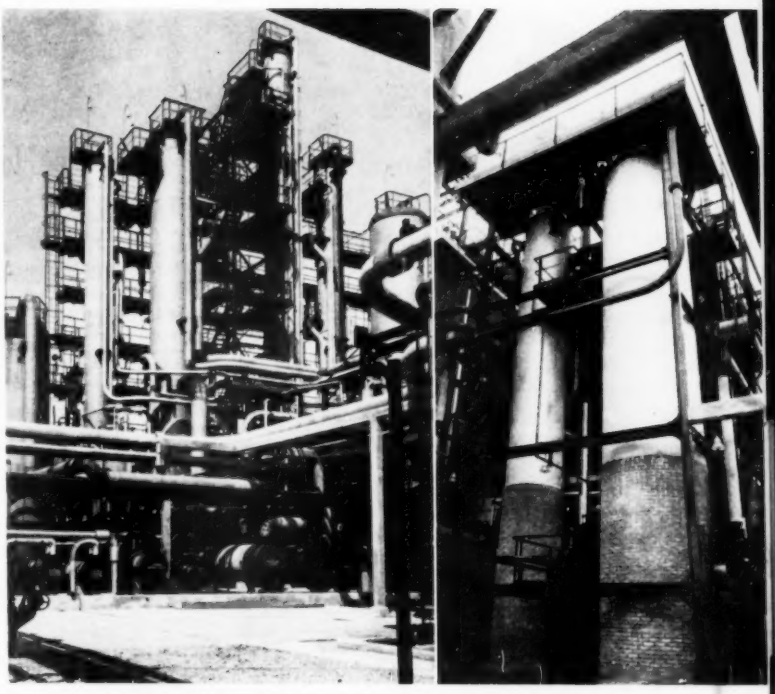
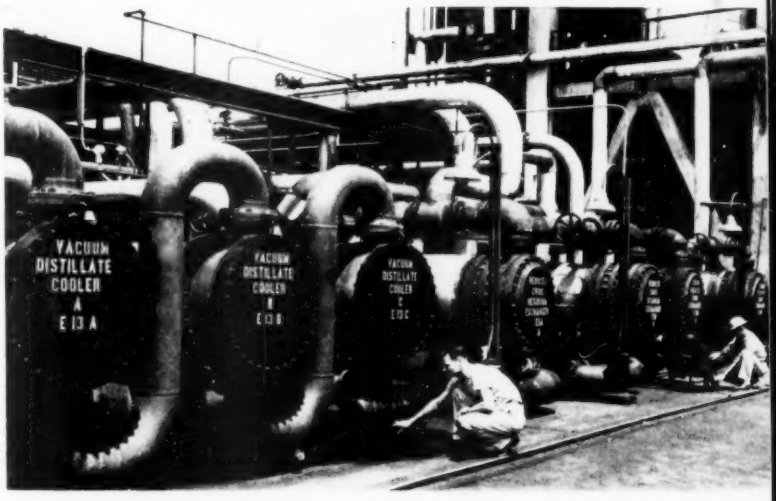


Battery of coolers and heat exchangers at Pure's new lube-oil plant.

Additional Features of Pure Oil's Smiths Bluff Lube Plant

Left: The phenol extraction unit at Pure Oil Co.'s Smiths Bluff refinery. Right: Solvent-recovery evaporators in the new M.E.K. dewaxing unit at Smiths Bluff.



ONE of the country's largest and most modern lubricants plants, located at the Smiths Bluff refinery of Pure Oil Co., has just gone into operation. The plant, very versatile in operation, is geared to produce a wide variety of greases and lubricating oils. Given here is a brief outline of the major equipment involved in the production of base stocks for the blending and compounding operations.

Lube-oil stocks for blending and compounding are obtained from Van field, Texas, crude oil. Processing facilities for preparation of lube stocks include a two-stage distillation unit, deasphalting and phenol-extraction unit, M.E.K. dewaxing, and contact filtering plants.

Two-stage distillation unit.—Input capacity of the atmospheric section of the two-stage unit is 20,000 bbl. daily, design basis. The fractionator in this section of the plant is 10 ft. in diameter and contains 46 plates.

Temperature of the atmospheric tower bottom material is raised to 730 F. prior to entering the vacuum column. This fractionator, 15 ft. in diameter, is equipped with 30 trays and is designed for three side-stream cuts. In addition to light, medium, and heavier lube-stock side cuts a heavy lube blending stock is produced as vacuum residuum.

Propane deasphalting.—Vacuum resid stock is processed in a propane deasphalting unit operating at 480 psi. Treating in the operation is with liquid propane. The bottom product, asphalt, is subsequently processed to specification products elsewhere.

Phenol extraction.—Removal of the undesirable constituents from the four lube-stock streams, light, medium, heavier, and heaviest, is carried out by phenol extraction; the fourth stream, heaviest lube stock, being previously treated in the deasphalting unit.

Solvent dewaxing.—An M.E.K. unit designed for an input rate of 4,000 bbl. daily is employed for dewaxing. Wax from this operation is further refined elsewhere.

Contact filtration.—Contact treating of the stocks is carried out with rotary vacuum filtering equipment. From this operation stocks are sent to storage for subsequent blending. Automatic proportioning equipment is used in the blending operations.

Engineering companies employed in the design and construction of the various units in the new lube plant at Pure's Smiths Bluff refinery were: Foster Wheeler Corp., two-stage distillation unit; M. W. Kellogg Co., deasphalting and phenol-extraction units; Lummus Co., design of the M.E.K., contact filtration and wax crystallization section.

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LIME-BASE MUDS

.. A Progress Report

by Jack L. Battle* and Preston E. Cheney†

This is a progress report of the 1949 A.P.I. Southwestern District Subcommittee on Drilling Fluids, in its study of lime-base muds. The results obtained from a lime-base study form are summarized and tabulated. A field test for estimating lime content of such muds is described, and tentative operating limits of concentration for the various treating agents are suggested. Paper presented at Dallas-A.P.I. Southwest District production meeting, March 8-10.

Introduction

INITIAL use of lime-base muds possibly occurred when drilling cement, limestone, anhydrite, and "gyp" formations with normal alkaline-tannate or so-called "red" muds. Under certain conditions, very undesirable mud characteristics resulted; in other cases, muds having very desirable properties were obtained.

Advantageous properties of such muds are low viscosity and gel strength with a somewhat higher tolerance for inerts and for the ordinary contaminants. The higher inert content permits a somewhat higher density without the addition of barytes. Furthermore, a cheap treating chemical (lime) is substituted for more expensive ones.

Initial field attempts to use so-called lime-base muds encountered considerable difficulty. Successful conversion from the sodium-base to the lime-base mud met with variable success. In some cases, extremely viscous, high-gel muds that could not be improved except by excessive water treatment were obtained on initial addition of lime, while in others, a completely satisfactory stable mud was obtained.

Lime Content

One of the greatest difficulties confronting such a study was believed to be the lack of a suitable method of determining the actual lime content of the mud, both in the field and in the laboratory. The standard laboratory methods were too complex and time consuming, and the muds presented too many interfering ions for satisfactory routine testing.

Soon after adoption of the project for committee study, Preston Chaney and H. W. Perkins of Sun Oil Co. in Beaumont, developed a method which has been of invaluable assistance in the field in estimating lime. This method is based on an alkalinity titration of the filtrate and of the whole mud.

Since the principal hydroxides present in the lime-base drilling fluid are the soluble caustic, or sodium hydroxide, and the slightly soluble lime, or calcium hydroxide, Chaney and Perkins reasoned that after the solubility of the lime had been exceeded, any further increase in phenolphthalein alkalinity of the filtrate would be accomplished only by changing the concentration of the caustic. Since both the caustic and the lime are titrated in the whole mud, variations of the phenolphthalein alkalinity of the whole mud could result from changes in the concentrations of either caustic or lime. This difference in the two titrations is utilized in deriving an equation for estimating lime.

It was recognized that changes in the caustic and lime concentrations in the drilling fluid would produce effects on the clay solids in the mud by mass action that would prevent a stoichiometric calculation of the lime by any simple formula. However, it was felt that the effects produced by variation in the type and amount of clay solids present were not great enough to prevent an estimation of total lime and variations in lime content within the limits of accuracy required for the field control of lime-base muds. Hence, in establishing the relationship to be used for estimating lime concentration, a mud containing 20 per cent solids was selected as being representative of average field conditions.

Fig. 1 is a curve showing the relationship between the filtrate alkalinity and the lime concentration in pounds per barrel of this laboratory mud. From this curve, it is seen that the filtrate alkalinities increase with increasing lime concentration up to a point corresponding to the maximum solubility of lime, after which there is no further increase in either phenolphthalein or methyl orange alkalinities. It will also be noted that throughout the range of lime concentrations, the difference between the methyl orange alkalinity and the phenolphthalein alkalinity is almost constant. Hence, it is unlikely that any relationship between phenolphthalein and methyl orange alkalinity

*Humble Oil & Refining Co., Houston.
†Sun Oil Co., Beaumont.

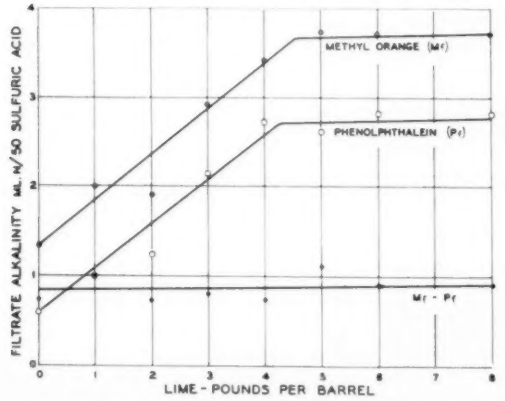


Fig. 1—(Left) Mf and Pf versus lime—1 lb. per bbl. sodium hydroxide.

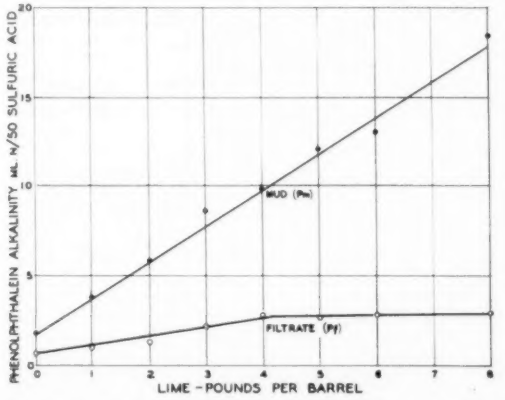


Fig. 2—(Right) Pm and Pf versus lime—1 lb. per bbl. sodium hydroxide.

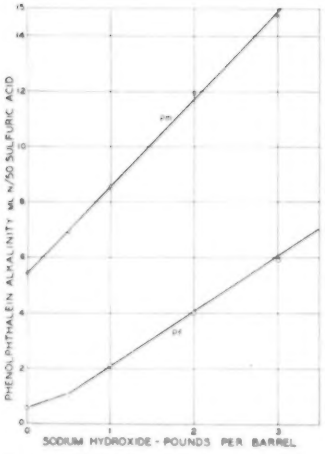


Fig. 3—P_m and P_f versus sodium hydroxide—3 lb. per bbl. lime.

of the filtrate can be indicative of lime concentration.

Fig. 2 shows the phenolphthalein alkalinity obtained by titrating 1-ml. samples of the whole mud (P_m), and of the filtrate (P_f) with increasing lime concentration. This demonstrates that the mud alkalinity increases progressively with increasing lime concentration, while the filtrate alkalinity rises until the solubility of lime is reached and remains constant thereafter.

Fig. 3 shows the changes in phenolphthalein alkalinity of the whole mud and of the filtrate with increasing caustic concentration. Here it is seen that both the mud alkalinity and the filtrate alkalinity increase progressively with increasing caustic concentration.

Since the filtrate alkalinity varies with caustic content, but not with lime content in the normal working range, it is possible to apply a correction for caustic content based on the filtrate alkalinity to the whole mud alkalinity value.

The relationship thus established yields the following equation as the best relationship between lime concentration and the alkalinity values, P_m and P_f:

$$\text{Pounds per barrel, lime} = 0.6\,(P_m - 1.3\,P_f) - 0.6$$

In this equation, the factor $(-1.3\,P_f)$ is the correction for caustic content of the mud.

Lime Procedure

The procedure used in estimating lime content by this method is as follows:

The phenolphthalein alkalinity of the filtrate (P_f) is run according to the procedure given in A.P.I. RP. 29,* par. 70 and 71. The value recorded as P_f is the number of milliliters of N/50 sulfuric acid required to titrate 1 ml. of the filtrate to the phenolphthalein end point.

For the mud alkalinity (P_m), 1 ml. of the whole mud is drawn into a 1-ml. serological pipette, and the outside of the pipette wiped clean. The pipette is drained into the titrating dish and then rinsed with 20-30 ml. of distilled water, which is also collected in the titration vessel. Two or three drops of phenolphthalein indicator are added and the sample titrated, with stirring, to the phenolphthalein end point. The end point is taken as the volume of sulfuric acid required to cause the pink color of the phenolphthalein to disappear and not return in approximately 30 seconds. The titration should be accomplished without undue delay to prevent interference from the slightly soluble calcium carbonate in the mud. The value of P_m obtained in this manner is recorded and the lime content obtained by substitution in the above equation.

It should be emphasized that the lime content, as determined by the above procedure, includes both dissolved and undissolved lime. This procedure is useful for maintaining a lime content in excess of the solubility of lime, but is not indicative of the dissolved lime concentration in the filtrate. The dissolved lime concentration in the filtrate is a function of the filtrate alkalinity and may be determined by conventional laboratory procedures, such as the oxalate, soap, or the newer versenate methods.

Study Forms: Results to Date

The subcommittee undertook to compile the results obtained with lime-base muds by the use of a study form. This form has been distributed to all interested companies with the request that as many as possible be completed and returned to the committee for study.

Results to date have been obtained from 42 wells covering an area extending from the Rio Grande Valley, Texas, throughout the Texas and Louisiana Gulf Coast, and into the East Texas area. Wells covered by this study range in depth from 5,000 to approximately 14,500 ft., and employed muds weighing from 10 to 18 lb. per gallon.

Data indicate that the lime concentration required for satisfactory mud characteristics varies in different areas. The optimum lime concentration is indicated to be within the range of 3 to 8 lb. of lime per barrel. Optimum phenolphthalein alkalinity of the filtrate is indicated to be in the range of 3 to 7.5 ml. of N/50 sulfuric acid per milliliter of filtrate. There is some indication that optimum alkalinity varies with the salinity of the filtrate and the type of dispersing agent used.

Table 1 presents a brief summary of the information received to date.

*A.P.I. RP 29; "Recommended Practice for Standard Field Procedure for Testing Drilling Fluids" (Third Edition, January, 1950) (In press).

Theoretical Considerations

As so frequently occurs, the practical application of lime-base muds has far outstripped the theoretical explanation of their properties and behavior. However, it is necessary to establish working theories as rapidly as possible, in order to expand the range of the usefulness of lime-base muds and to make possible their control on a scientific rather than a cut-and-try basis.

Until recently, the difference in properties of lime-base and sodium-base muds has been attributed to a difference in degree of hydration of the two clays. This point is the subject of considerable controversy, but more recent literature indicates that the calcium montmorillonite is actually hydrated to a greater degree than the sodium montmorillonite. Such a difference need not alter our explanation of mud behavior if we more carefully define the terms "hydration" and "swelling." Although these terms have long been used synonymously, there is considerable evidence in recent literature to indicate that swelling may result from a weakening of the binding force between clay sheets, resulting from ion adsorption, and may or may not be related to the degree of hydration.

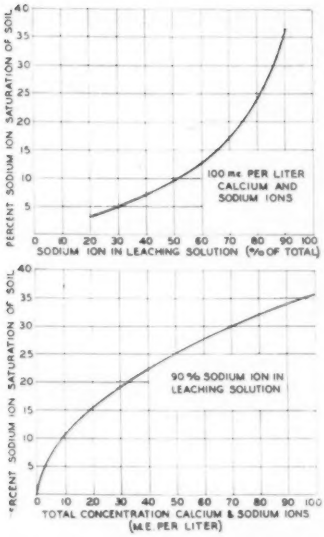
Grim[1] states as follows:

"It is a well-known fact that sodium montmorillonite expands greatly in the presence of abundant water, whereas, under similar conditions, calcium montmorillonite expands very little. According to this concept, the great swelling of the sodium montmorillonite is due, not to the hydration of the sodium ion serving as a wedge to force the layers apart, but to the absence of a strong bridge because of the univalent character of the sodium ion, and perhaps, also, because of its small size, enabling it to fit well in the hole of a silica sheet. The calcium montmorillonite does not expand greatly, not because of the slight hydration of the calcium ion, but because the divalent ion holds the layers together so that a thick series of water sheets cannot form between them."

Even though the clays in lime-base mud are usually considered to be entirely calcium clays, it seems likely that both calcium and sodium are present simultaneously in the base

TABLE 1—SUMMARY OF DATA FROM A.P.I. LIME-BASE-MUD STUDY FORMS

Well	Location	Limed interval (ft.)	Chemicals used (pounds per barrel) — Conversion — Lime	Conversion — Caustic	Conversion — Dispersant	Maintenance — Lime	Maintenance — Caustic	Maintenance — Dispersant
A	North Cankton, St. Landry Ph., La.	9,150-10,500	9.3	1.1	4.5	6.4		
B	Hanna Reef, Galveston Bay	10,250-12,500	4.7	0.9	8.5	6.0		
C	Lockport, Calcasieu Ph., La.	9,405-11,305	3.6	1.0	2.2	3.3		
D	North Winnie, Chambers Co., Tex.	7,672-10,627	3.2		3.8	7.5		
E	Saratoga, Hardin Co., Tex.	5,547-10,400	2.9	0.5	2.9	5.2		
F	South Jennings, Jeff Davis Ph., La.	9,500-10,600	5	2	2	6.5	2.1	2.3
G	North Cankton, St. Landry Ph., La.	9,400-11,200	6.2	0.75	3	8.0	3.4	1.5
H	Leeville, Terrebonne Ph., La.	11,998-15,000	2.5	2.5	3			


PERCENT SODIUM ION SATURATION OF SOIL
100 me. PER LITER CALCIUM AND SODIUM IONS
SODIUM ION IN LEACHING SOLUTION (% OF TOTAL)
90 % SODIUM ION IN LEACHING SOLUTION
TOTAL CONCENTRATION CALCIUM & SODIUM IONS (M.E. PER LITER)

Figs. 4 and 5—Maximum sodium ion saturation of soil produced by leaching with sodium-calcium salt solution. (Plotted from data given by W. P. Kelley in "Cation Exchange in Soils.")

exchange position. Figs. 4 and 5, taken from data by Kelley,[2] indicate that the relative saturation of clays is dependent upon both the ratio of calcium and sodium ion concentrations in solution and the total concentration of dissolved calcium and sodium ions.

The particular data plotted in Figs. 4 and 5 were selected as most closely approaching the usual operating range for lime-base mud. It is apparent that

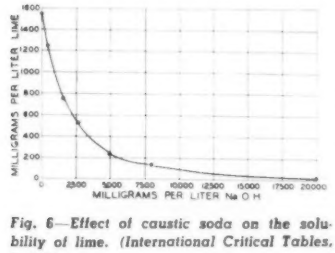


Fig. 6—Effect of caustic soda on the solubility of lime. (International Critical Tables, 7, 340).

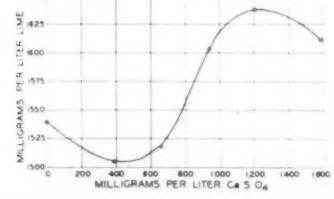


Fig. 7—Effect of calcium sulfate on the solubility of lime. (International Critical Tables 7, 340).

even in lime-base muds containing excess lime, as much as 5 to 35 per cent of the base exchange capacity of the clay may be saturated with sodium. A further observation from practice suggests that the degree of swelling of the clays and their rate of dispersion are dependent upon the calcium - sodium ratio or base exchange relationship.

The calcium - sodium ratio may also affect mud properties by altering the solubility of dispersing agent. Most presently used dispersing agents for lime systems can be precipitated by a high calcium-to-sodium ratio. The particular calcium-to-sodium ratio required for precipitation of the dispersing agent will, of course, vary with the nature of the dispersing agent used. Unpublished data indicate that there may be a considerable variation in the solubility of the various dispersing agents at a given calcium to sodium ion ratio.[3]

Fig. 6 is a plot of the solubility of calcium hydroxide in solutions containing sodium hydroxide. (Taken from the International Critical Tables).[4]

It will be observed that the solubility of lime decreases rapidly with increasing sodium hydroxide concentrations. Hence, the addition of sodium hydroxide to a lime-base mud reduces the calcium to sodium ion ratio, both by reducing the calcium solubility and by increasing the sodium ion concentration. The calcium to sodium ratio is, therefore, a function of the filtrate alkalinity and may be controlled by adjustments of the filtrate alkalinity. However, the presence of other soluble salts may influence the solubility of lime, as indicated in Figs. 7 and 8. Fig. 8, showing the effect of salt on the solubility of lime,[5] may explain the necessity for increasing the filtrate alkalinity to overcome the effects of salt contamination.

The optimum lime concentration, as found from well practice, is considerably in excess of the solubility of lime. Assuming a mud containing 1 lb. per barrel of sodium hydroxide and 30 per cent clay solids, and the clay having a base exchange capacity of 25 milliequivalents per 100 g., the lime required to completely saturate the clay and the water phase of the mud is slightly less than 1.3 lb. per barrel. Yet, the minimum recommended operating lime concentration is 3 lb. per barrel. Hence it is evident that satisfactory operation of

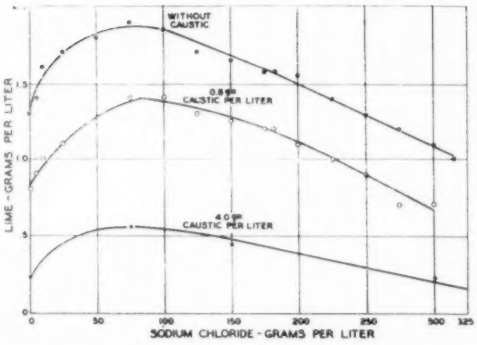


Fig. 8—Solubility of lime in sodium chloride solutions with and without caustic.

lime-base drilling fluids requires a lime concentration sufficient to saturate the mud system with an additional excess or reserve to replace any losses of dissolved lime.

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3. Dawson, L. R., Unpublished Data, Millwhite Laboratories.
4. International Critical Tables, 7, 340.
5. Maigret, M. E., Bulletin de la Societe Chimique de Paris 33, 631 (1905).
6. Siefert, A. C., and Henry, E. C., Effect of Exchangeable Cations on Hydrophilic Nature of Kaolin and Bentonite, Jour. Am. Cer. Soc., 30, 2, 37-48, Feb. (1947).

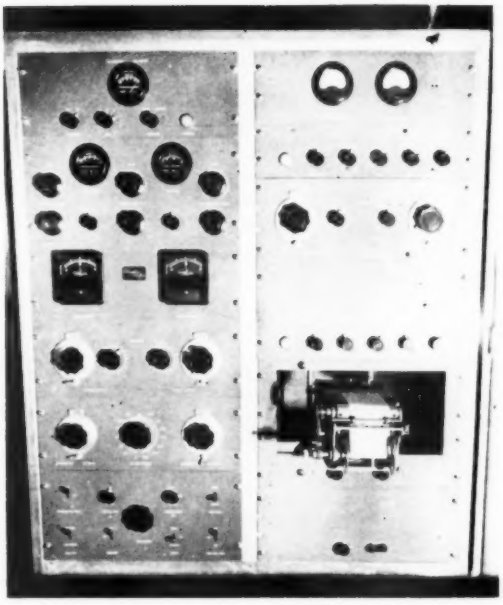
BOOKS

SAFETY IN PETROLEUM REFINING AND RELATED INDUSTRIES. Compiled for John G. Simmonds & Co., Inc., 111 John Street, New York 7, by George Armistead, Jr., 1200 18th Street, N.W., Washington, D. C. Copies obtainable from Security Publishing Corp., 1200 18th Street, N.W., Washington 6, D. C. 425 pp. $10.

The broad objective of this handsome volume was to make available within a single cover of a summary of practical safety fundamentals applying to petroleum refining and the related portions of the chemical industry. The goal has been achieved, and a work compiled which is comprehensive, understandable to others than technologists, sound in its fundamentals, and useful to some degre to most persons employed in these portions of industry. The book is divided into 12 chapters with 8 appendices, and is illustrated with 238 photographs, flow diagrams, and other illustrations. The extensive tabulations given in the appendix show, among other things, detailed properties of 323 flammable liquids, vapors, and solids, and of 115 common hazardous chemicals, and there are 24 pages of tabulation of allowable operating pressures for various sizes of piping and heater tubes under a wide range of temperatures and thicknesses. An interesting feature of the presentation in the first chapter relates to general safety policies and the cost of maintaining maximum safety, both with regard to investment and continuing costs. Figures are presented to show that with the maximum feasible provision of safety equipment, a typical 25,000-bbl. per calendar day complete refinery would cost approximately 5 per cent more than with the bare minimum of provisions which are almost always provided.

INDUFLUX

. . . new method for testing fatigue in sucker rods



Left: The test trailer showing the instrument panel in the operator's room at the front of the trailer and the gasoline generating unit through a service door at the rear. Right: The instrument panel as set up in the trailer. The curves resulting from the test are recorded on the instrument at lower right.

by D. H. Stormont
California District Editor

THE Induflux test determines the relative amount of fatigue in sucker rods. It also shows variations in grain structure resulting from heat treating. It locates the point of these variations. These conditions and their degree are determined by measurements of the differences in magnetic properties of the rods. The test itself is a development of Emmett Irwin, now manager of Induflux Testing Service, Los Angeles.

Correlation of the magnetic properties of steel with the physical properties, on which the test is based, has been generally understood since the work of Spooner and DeForest in 1923. Much development work and time intervened before the theoretical work of these men was applied to the solution of practical problems.

Waugh Laboratories, which normally specializes in railroad-equipment studies, developed the first applications. At the time of this work, Irwin was manager of the West Coast branch of the company. About 1938 he became interested in the possibility of applying some form of the magnetic-physical relationship to analysis of sucker rods.

Before much work could be done, the war blocked activity along this particular line. Irwin was employed by the Ordnance Department and took up the problem of constructing a device that would determine, rapidly, the hardness of shell cases.

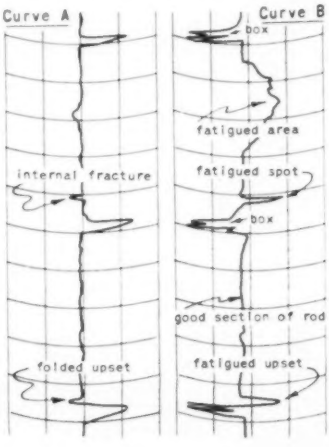
The successful completion of this

Interpretation of Curves

CURVE A — Internal resistance curve		CURVE B — Magnetic properties curve	
Left deflection	Right deflection	Left deflection	Right deflection
Indicates	Indicates	Indicates	Indicates
Higher electrical resistance of steel	Lower electrical resistance of steel	Increased electrical permeability	Decreased electrical permeability
Produced by	Produced by	Produced by	Produced by
Lower quenching temperature	Higher quenching temperature	Higher draw temperature	Lower draw temperature
		Physical softness	Physical hardness
Longitudinal flaws or fractures	Increase in cross-section of specimen	Increase in cross-section of specimen	Fatigue

Rods of different chemical composition will have different positions on chart.

In general, rods having the greatest resistance to fatigue will be positioned farthest to the left.



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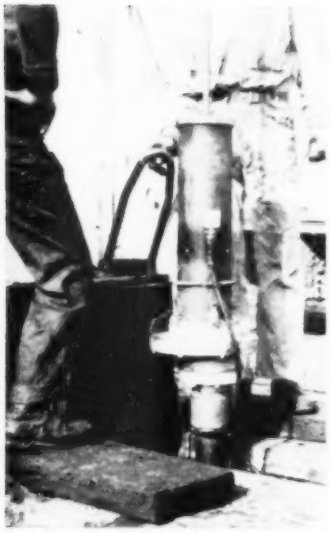


A view at the well head during the test. The coils are inside the Bakelite case attached to the well casing. The rod being drawn from the well can be seen at the top of the coil case.

project provided the basic patents on which the present Induflux test is founded. The equipment used for the shell casing tests was rebuilt, improved, and most important, a recording device was added.

The result is a series of analyzing and recording instruments that give a foot-by-foot record of the internal condition of sucker rods as they are drawn from a well. The test is run during normal servicing operations.

The basic piece of equipment is an air-core transformer. This is the magnetizing member of an electromagnet and consists of coils enclosed in a Bakelite case. The case fastens to the casing at the well head. The sucker rods are drawn through the coil and thus become the core of the electromagnet.

A 3-kw. gasoline-powered generating unit provides 110-volt, 60-cycle current. This alternating current flowing through the coil magnetizes the rods as they are drawn from the well and through the coil. About 1 kw. is used in the operation.

With the rods serving as the transformer core, changes in the magnetic properties of the rods make corresponding changes in inductance of the transformer. The record of inductance and changes in inductance gives a picture of the internal condition of the rods.

As the rods do not come in contact with the transformer coils no cleaning of the rods is necessary for the test. Oil and wax have negligible effect on the test.

More important is the removal of magnetic forces picked up by the rods while in the well. These are the result of the magnetic action of the earth, and to a less extent, static charges. These charges are eliminated by an automatic degaussing device just before the rod enters the coil.

The only action required prior to running a test is the calibrating of the instruments. This is accomplished with a set of subs of known magnetic properties. Once the equipment is calibrated, readings can be taken as fast as an average servicing unit can pull. The usual servicing crew is sufficient for the operation.

As each stand of rods is removed from the rod string it is tagged with a number. The same number is written along the recorded curves for that particular stand. This identifies the rods with their recorded resistance and magnetic properties.

A Selsyn motor relays the length of rod passing through the coil to the recording equipment. The length of the curve is in exact ratio to the length of rod. Various ratios can be used but are generally 3 in. to 30 ft. of rod. This locates exactly the points of fatigue, cracks, etc.

The recording equipment is contained in a trailer set up at some convenient distance from the well head. The operator at the trailer communicates with his assistant at the well head through a loud-speaker system.

With the completion of the pulling operation, the curves are analyzed, and the rods are rated into four classes. Rods in first class condition are rated No. 1. These are held for reassembly in the string in their original position or held for relocating at a point of greater load. Rods showing a small degree of fatigue are rated No. 2 and are generally left in their former place in the string.

Class 3 rods show fatigue to a marked degree. These are set aside for reassembly lower in the string where the load is less. Where severe fatigue, cracks, and/or structural changes are recorded, rods are rated No. 4. These are listed for discard and replacement with new rods.

It is possible to complete three 5,000-ft. tests in a day. Time required for a test is roughly the same as the time needed to pull the rod string. Total cost of a test approximates 5 cents per foot.

Where the rods are already pulled and stacked they can be tested right from the rack. The transformer coil is set in a horizontal position and the rods passed through by hand.

Plans are now under way for setting up a Mid-Continent office. This is expected to be in operation before the end of 1950.

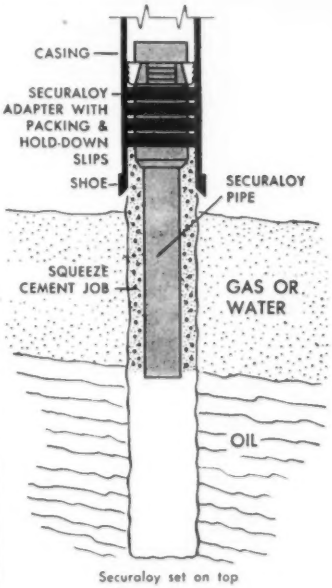
Future development of this test is directed toward its application in the analysis of drill pipe. Some progress has been made along this line. However, it is not yet ready for field runs.

USE OF SECURALOY SOLVES MANY PRODUCTION PROBLEMS

Securaloy pipe, which may be removed with chemicals or a drilling bit, is being used to solve many "difficult" production problems, such as correcting gas-oil ratios, water shutoffs and plug backs.

CORRECTING GAS-OIL RATIOS

This method is similar to that used in the case history shown on the opposite page except that the Securaloy pipe extends through the gas zone to the top of the oil zone.



Securaloy set on top of producing zone

This method is used where the entire oil zone can be produced from open hole and where it is not necessary to confine the oil production to selective strata. The hole through the oil zone is first filled with gravel. Securaloy pipe is run and squeeze cemented in position. When the cement has set, Securaloy cementing shoe and gravel are cleaned out and well is ready for production, with gas or water successfully under control.

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PRODUCTION: 5-6 barrels per day on pump
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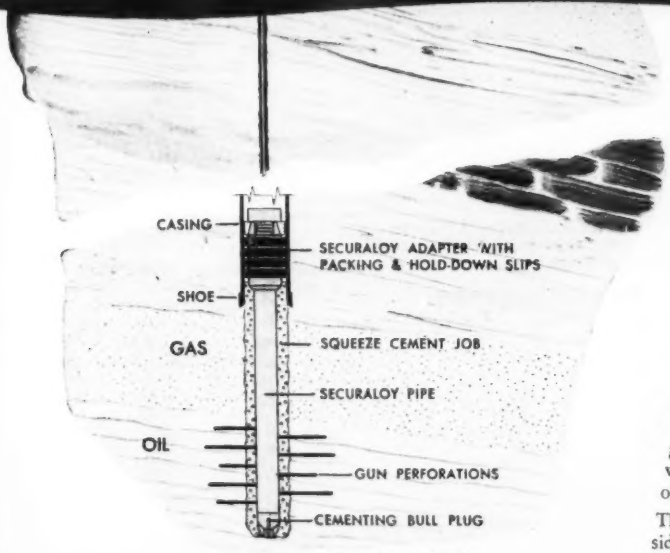

Securaloy set through Producing Zone

When a Texas operator found his gas-oil ratio too high and production way down he determined that the positive way to correct this situation was to use Securaloy. You, too, can profit by using Securaloy to solve your gas-oil ratio problems.

This operator first tried a plastic squeeze job, but the well still made only 6 barrels per day. Then a cement squeeze job was performed, with the entire open hole left full of cement and then drilled out. This proved unsuccessful too!

Finally, the operator cemented Securaloy pipe through the gas-oil sands, as shown. Selective strata were gun perforated and acidized. The well was then completed for 80 barrels of oil per day with a 40 to 1 gas-oil ratio!

This same remedial method is now considered standard practice . . . Another example of the application of Securaloy to solve your production problems.

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Approach to the ORIGIN OF OIL

by Walter K. Link

PETROLEUM, which plays such an important role in our own and the world's economy, has caused geologists to theorize as to its origin. Geologists feel that, if they knew exactly how oil is formed, they could find greater supplies at lower cost. The approach in the past has been by examination of the ancient sediments associated with oil deposits. These studies have not been successful and the writer suggests that the "Reverse Approach" be tried.

The reverse approach suggested is a study of the young sediments rather than the ancient. Geological processes in operation on the face of the earth today are the same as those of the past. If our theories of oil formation are reasonably correct, then oil should be forming in the sediments being presently deposited in some of the sedimentary basins today.

The formation of petroleum from organic substances is probably primarily a chemical process, but it is not clear how these processes worked. By studying the sediments within an oil area, the geologist can fairly accurately tell a lot about them, such as the environment of deposition, rate of deposition, temperature at time of deposition (this is determined by fossils, knowing what environment animals had to live in), probable source of sediments, and many other important factors. All of these things must have played an important role in the process of oil formation. In spite of this knowledge, and experimental work by the American Association of Petroleum Geologists, the American Petroleum Institute, educational institutions, and oil companies, no clear-cut answer as to oil formation has been obtained.

Geologists talk freely and vaguely about oil-forming formations or mother rock, yet no two will completely agree as to what a mother rock looks like. Actually rocks close to and associated with oil fields generally do not look petroliferous at all. Black shales that do, and from which something that looks like oil can be extracted, are generally not associated with liquid oil deposits.

Processes of Oil Formation

Probably the most baffling characteristic of shales, etc., adjacent to oil pools is the fact that these rocks have little or nothing left in them that physically and chemically looks like residue of oil generation. Perhaps the chemical processes are such complete ones that everything turns into oil, leaving little or nothing for the chemists to work on in the ancient sediments.

Fig. 1—Map showing deposition of sediments in Gulf of Mexico.

Walter K. Link, author of this article, is chief geologist, producing coordination department, Standard Oil Co. (N. J.), with headquarters in New York. Starting with his present company, immediately after being graduated from the University of Wisconsin in 1925, he worked first in Venezuela and Colombia. Then followed 7 years in the Netherlands East Indies. Returning to the United States, he worked for Carter Oil Co., then became exploration manager for Standard Oil Co. of Louisiana. From 1940 to the spring of 1947, he was first exploration manager in the West Indies and Central America, and then exploration manager of work for International Petroleum Co., Ltd., in Colombia, Ecuador, and Peru. He has been on his present assignment since the spring of 1947.

Geologists believe that the processes of oil formation could be as follows:

1. The accumulation of organic materials in sediments.

2. The transformation of this organic material into hydrocarbons.

3. The final change of these hydrocarbons into real petroleum — called maturing of oil.

A great deal of work has been done on oils themselves. This is understandable because refining of petroleum into usable products is the life blood of the oil industry. Geologists and chemists have tried to use the knowledge gained by this work in the origin search. It is possible to take petroleum and break it into all of its component parts. One weakness in the idea of trying to take oil and transform it back into the original raw material derives from the fact that one cannot visualize with certainty the byproducts that were evolved during crude-oil formation. The Ancient Sediment approach is plagued with the same problem. The reverse approach is not, because it

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sets a new high in speed and simplicity in changing rams.

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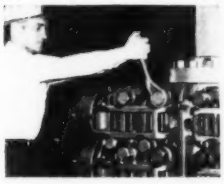
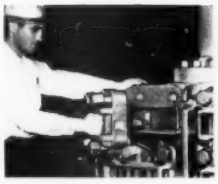
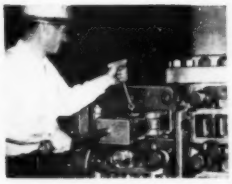


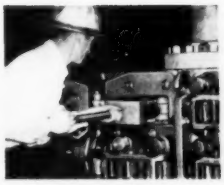
1. Unbolt Two Doors in the side of the Gate. You don't even have to remove the bolts—they remain in the doors where they can't become lost.



2. Swing the Doors Open and pull out the ram assembly. There's nothing to loosen, unlock or disengage. It slides right out.



3. Lift the Rams from the Gate and simply replace the Ram Blocks and rubbers with others of the desired size and type.

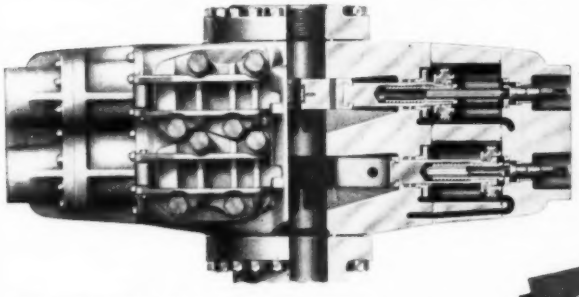


4. Slide the Ram Assembly back into the Gate, close and bolt the doors. Closing the doors automatically aligns Ram Assemblies within Gate.

It's as simple as that—and as fast. And here's another important feature—you can make a complete ram change *whether the pipe is in or out of the hole!*

Best of all the unusual speed and simplicity with which rams can be changed is only one of *many* vitally important advantages that Shaffer engineers—pioneers in the development of high pressure control equipment—have incorporated into the Shaffer Hydraulic Cellar Control Gate. A few of the many other features are outlined at right. But be sure to get the *complete* story before you buy *any* cellar control gate equipment. No other equipment provides so much protection—in such a compact space—with so many operating advancements as . . .

The SHAFFER HYDRAULIC CELLAR CONTROL GATE!



The sectional view above shows how two separate ram compartments are unitized into one compact body. Note the self-draining bottoms of the ram compartments . . . the direct hydraulic drive . . . and the completely enclosed design of the Shaffer Hydraulic Cellar Control Gate!

Write for the new Shaffer 1950 Catalog that gives full details on the Shaffer Hydraulic Cellar Control Gate as well as on other Shaffer products!

See pages 4432 to 4496 of the 1950 Composite Catalog.

Additional unique features in the Shaffer Hydraulic Cellar Control Gate

- **SPACE SAVING COMPACTNESS:** Two separate ram compartments are unitized into one body, yet the *overall* height of the entire Gate, including *both* compartments is only 30" even in sizes as large as 13⅝". Smaller sizes even less!
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- **DIRECT HYDRAULIC DRIVE:** Hydraulic operating cylinders are *directly behind* the rams for direct action, maximum simplicity, greatest safety. No secondary connections between hydraulic cylinders and rams!
- **SELF-DRAINING BODY:** The rams travel on high narrow guide ribs raised above the steeply-sloped bottoms of the ram compartments. Mud and sand quickly drain back into the well—no detrimental accumulations to interfere with free operation of the rams!

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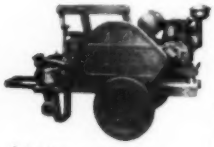

A Marlow "Mud Hog" Diaphragm Pump will take a trickle or full capacity at each stroke.

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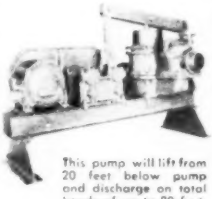

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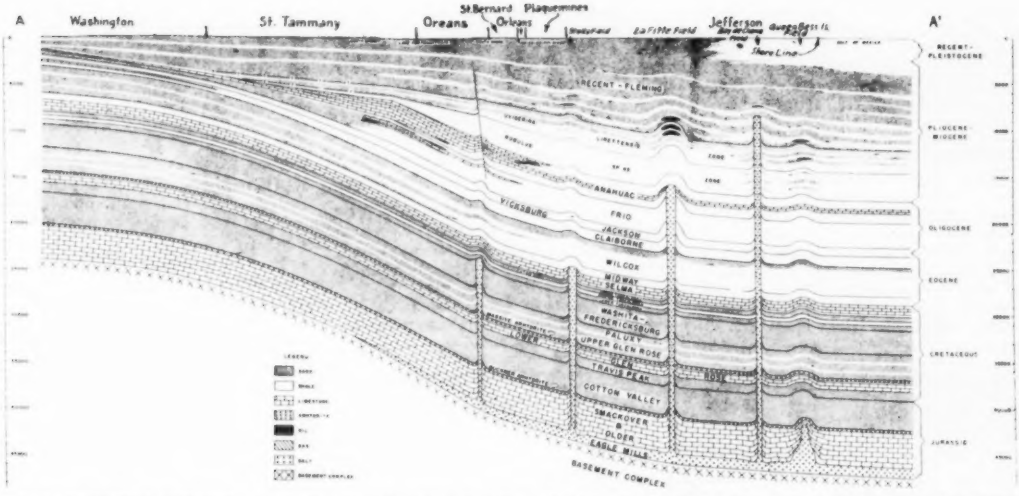

Fig. 2—Generalized north-south cross-section through eastern Louisiana showing stratigraphy of formations dipping under Continental Shell. Section starts on north in Washington Parish.

is progressive and therefore becomes the "Direct Approach."

We are mainly concerned with the transformation of organic material into petroleum, and believe these processes are:

1. Bacterial action.
2. Radioactivity.
3. The purely chemical activity along with temperature, pressure and time, and in the presence of, and with the aid of, catalysts.

Under certain conditions it is conceivable that petroleum can be formed by any one of the three alone, but it is more logical to believe that all three acted on the same materials, with most emphasis on the chemical processes, to form petroleum.

Geologists have a fairly good idea under what conditions oil was formed. Many believe that the processes of oil formation must begin as soon as sediments are deposited and, if nothing happens, should continue to completion. In the Gulf of Mexico along the Louisiana and Texas Gulf Coast, the conditions of deposition, temperature, et cetera, seem to be almost the same now as they were in Tertiary time. There is much Tertiary oil in that region, and furthermore, there is some accumulation in Pliocene sediments. Whether it originated in the Pliocene sediments or not is subject to question. If oil is forming in these young sediments, then there must be some way to ascertain this by positive methods. No one knows what comes first: gas, heavy hydrocarbons, light hydrocarbons, waxes, or what.

In the Gulf Coast there is a considerable thickness of sediments above the Tertiary (which is oil bearing) of Pliocene, Quaternary, and Recent age. Sedimentation there has been continuous from Tertiary time to the present, as this region has not been subjected to important move-

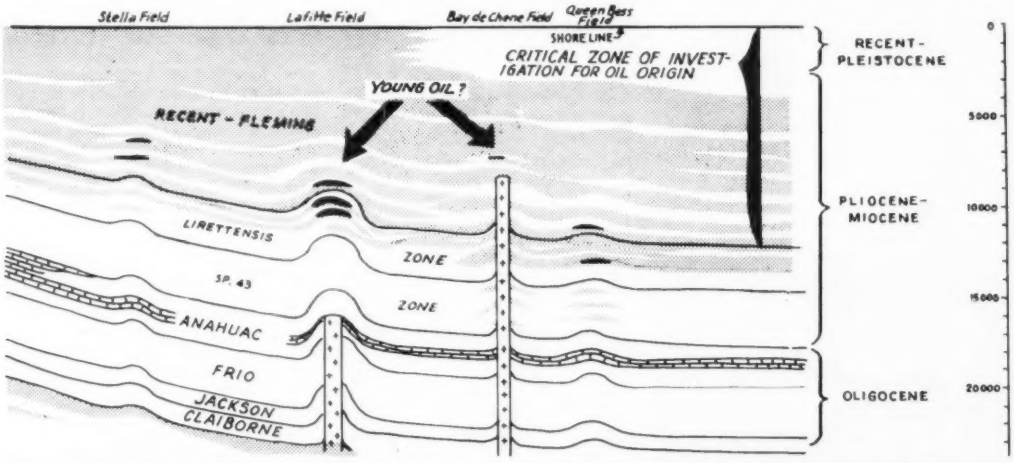

Fig. 3—Enlarged portion of Fig. 2, showing one general area where "reverse approach" to origin of oil might be applied. This section shows: (1) Great sedimentary fill younger than Tertiary where oil can now be originating. (2) Undisturbed section except for doming by salt and a normal fault. Excellent compaction studies can also be made of a thick fill—undisturbed section. (3) Oil trapped in Pliocene or youngest Miocene—which may be Pliocene oil.

ments, other than tilting, normal faulting and salt-dome growth.

The sediments in this region, therefore, are ideally adapted for a systematic and thorough analysis from Recent through Tertiary time.

The writer believes that the processes of oil formation in the earth are mainly chemical, and that the answer to oil origin must be approached from that angle. This means that organic-chemical-analysis techniques will have to be experimented with and perfected to do the job.

A systematic foot-by-foot analysis of sediments, starting with the youngest and going down to the oldest, in which oil is known to exist, should be carried out. If oil, or the material from which oil is formed, begins to form early in the stage of deposition and burial, then careful analysis of sediments should indicate what the early and subsequent alterations of organic material into petroleum are, and eventually a hydrocarbon or a recognizable oil may be detected on a very small scale, disseminated through the sediments.

The collection of samples and material, for analysis, will be an important, and probably an expensive, part of this project. The following methods might be employed.

1. Collection of bottom samples in a present-day depositional basin (Gulf of Mexico). The A.P.I. project on sedimentology, if carried out, would be an excellent way to get such samples.

2. Wells are being drilled in the waters and swamps of the Gulf Coast. One or more of these wells should be cored continuously and in as sterile a manner as possible.

3. All methods of analysis, that is, chemical, bacterial and radioactive, should be used on the same samples, foot by foot.

4. If at all possible, wells that have a good chance of becoming producers from the older sediments below, should be chosen for coring.

If oil is forming today in young sediments, then chemical analysis should reveal the presence of the first clues to hydrocarbon formation and the resulting changes of continued chemical activity and geologic processes. It must be remembered that sedimentary load and pressure alteration will be at work with depth. The process of transformation to rock will also be accurately gaged, and the results of load on different types of sedimentary materials, such as muds, sands, silts, and shell limestone beds.

The results of temperature will also be evaluated. Geologists have always placed much stress on temperature. It may be found or proved that normal sea-bottom temperatures of warm waters are sufficient to start the processes of oil formation, and that oils are generated and completed in a relatively low-temperature environment. Tertiary oils certainly suggest this possibility.

The idea that oil took a long time to form may be a fallacy. Much oil is found in old formations, but this does not mean that the oil found in these formations took a long time to form originally. Time may have altered this oil to the extent that older oils appear to have somewhat different characteristics and a lighter gravity. The older rocks in general had many more oil pools associated with them than are present in those formations today. During geologic time and the processes of earth movement many oil pools were destroyed, and we are looking only at those that were fortunate enough to survive, or at traps that caught the redistributed oil.

In oil areas the Tertiaries and Cretaceous generally show the most surface manifestations of oil and gas. The reason for this may not be because the Tertiary rocks generated more oil, but because there has been less time for this oil to have become dissipated. Because of this belief, the writer thinks that the key to oil origin lies in the sediments now being deposited, and in the examination of the young sediments in basin areas (such as the Gulf Coast) where sedimentary and environmental conditions appear to be much the same as in Tertiary time, an era of great oil formation.

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PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Nickel Plating

THE following discussion of the use of nickel plated steel in the petroleum industry was presented by W. H. Prine in "High Corrosion Resistance Gives Nickel-Plated Metals Wide Range of Uses" (Materials and Methods, Dec. 1949).

In order to keep abreast of the increasing demand for petroleum products, the oil industry has had to rely on production from the "sour" oil wells. The presence of hydrogen sulfide along with carbon dioxide causes the sour crude oil to be very corrosive to oil-well tubing and requires some means of protection. This gives rise to a potential field of application for nickel, which is well suited for use in these corrosive media.

Over 30,000 lineal feet of 2 to 2½-in. tubing have been internally nickel plated for installation in distillate gas wells where these extreme corrosion conditions are encountered. These orders were placed on the basis of the excellent performance of sample lengths of the plated pipe which showed no effect of corrosion while a carbon steel pipe was severely corroded. One 10,000-ft. length of plated tubing has been installed in a well which is sunk several miles off shore in the Gulf. This tubing has been given a nickel deposit of 0.006 in. Plating is regulated so as to plate over the outside threads on the ends of the pipe to protect them. The couplings are also plated internally, giving full protection to the surface in contact with the oil.

Nickel plating is being tested for protection of the field storage tanks. These tanks are of bolted construction. Since just the bottom and lower sides are subjected to corrosion, only those sections are being plated. This provides the most economical means of construction, giving protection only where it is required. Acceptance of this application can lead to nickel plating of the roof section, where corrosion also occurs in the vapor phase.

Expensive Corrosion

ONCE a metal part exhibits the strength and necessary physical properties for a proper performance, we may still be robbed of its usefulness by corrosion. Although our national income is said to be nearly $300,000,000,000, the estimated annual losses of industry by corrosion ($6,000,000,000) is still a formidable figure. It is a figure comparable to or exceeding the sales taxes collected in many of our states.

Huge sums of money are spent on corrosion research in an effort to save some of the expense. Although perfect means of handling all types of corrosion have not been developed, certain important facts emerge from the mass of corrosion data already at hand.

Much can be learned by conducting a corrosion test which duplicates the operating conditions. If this is difficult or impossible we must account for these variables by estimates of the behavior. A part usually corrodes more rapidly when moving at a high velocity than when moving slowly. The rate of attack may be affected by the concentration, quantity, or temperature of a solution, and the concentration of gases above the solution may even affect the rate of corrosion. Galvanic action may hasten the rate, and high corrosion rates may occur at points of localized stress concentration. The attack may occur only at the grain boundaries, it may take the form of pits, or it may extract metal from the interior, leaving a spongy mass. These several illustrations by no means complete the many factors that may be encountered, and for those that are directly interested a new International Nickel Co. booklet entitled, "Corrosion and the Final Choice," will soon be available.

Some Ceramics Superior To Metals for Extreme Temperature

ACCORDING to a recent report issued by the Bureau of Standards, some ceramic bodies have strength and creep characteristics at 1,800° F., superior to the best high-temperature alloys available in 1944. The six ceramics were developed especially for use in jet engines and gas turbines.

Some tensile strengths were as high as 18,000 psi. at 1,800° F., and 15,000 psi. at 1,900° F. The strengths drop off rapidly at higher temperatures to about 5,000 psi. at 2,000°-2,200° F. The largest creep rates for all the oxide bodies tested ranged from about 0.0001 to 0.0002 per cent per hour at 1,700° F.; from 0.0002 to 0.0008 per cent per hour at 1,800° F. for a 16,000-psi. stress; and 0.0003 to 0.0004 per cent per hour at 1,900° F. and 10,000 psi.

The strongest oxide bodies reached a maximum of about 18,000 psi. in rupture tests at 1,800° F. Two of the materials showed about 16,000-psi rupture strength at 1,900° F., but the other materials showed low rupture strengths at temperatures over 1,800° F.

Graphite Corrosion-Resistant Globe Valve

A NEWLY designed graphite globe valve is announced by National Carbon Division, Union Carbide & Carbon Corp. The valve, 1 and 2-in. sizes, is designed for shut-off and throttling service with corrosive fluids free from abrasive solids. Except for the Teflon packing, all valve parts in contact with the fluid are Karbate impervious graphite, thus preventing corrosion and contamination, and practically eliminating replacement and maintenance expenses.

The outstanding features of the new globe valve are its resistance to practically all corrosive chemicals, including hydrochloric acid, dilute sulfuric and hydrofluoric acids, and chlorinated organic compounds, and its resistance to thermal shock. Because of the excellent thermal conductivity of impervious graphite the valve may be readily heated from a steam coil of copper tubing wrapped around it, when heating is required for handling highly viscous or saturated solutions.

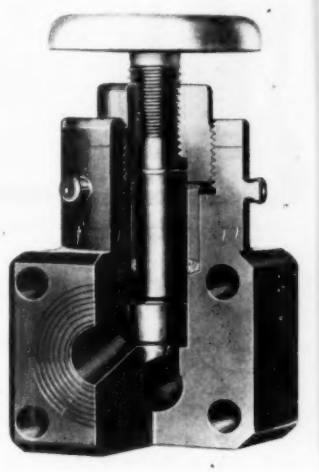

Fig. 1 — Karbate corrosion-resistant globe valve.

The tapered disk valve seat assures accurate and close control of fluid flow, and it is self-reseating (see Fig. 1 on this page). The valve is light and small, has short face-to-face dimensions, and is self-lubricating. Sturdy and compact construction insure long life, trouble-free operation, and ease of installation.

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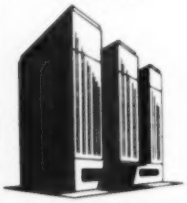

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PLANNING MODERN GAS-COMPRESSOR STATIONS

5. Safety Devices and Station Heating

by Tyler G. Hicks*

ALTHOUGH every precaution is taken to insure a well-operating gas-compressor station, full reliance upon human control is almost certain to introduce difficulties sooner or later. Such difficulties arise despite every effort the operator makes to maintain the station in good running condition at all times. As compressor stations have increased in capacity, so too have they increased in complexity.

With as many as 16 or more compressors on the line at the same time, it can readily be seen that even the best of operators cannot be expected to be aware of the varying conditions in each unit. As a result, greater dependence on automatic controls and safety devices is the key to the success of large, modern stations. Automatic controls relieve the operator of much unnecessary routine checking and permit him to devote his time to the important phases of station operation. Therefore, every design which aims at the safest and most economical operation must carefully consider automatic controls and safety devices.

*Consulting engineer, New York City.

Types of Controls

Most automatic controls increase the cost of station construction whereas all basic safety devices are usually supplied as part of the compressor. Safety devices which cannot be considered as basic, such as torque controls and special unloaders, generally are extra. Where essential to effective station operation, neither automatic controls nor safety devices can be neglected on the basis of increased construction costs. The amounts of such increases are usually so small when compared with total station cost that they can usually be justified.

Table 1 summarizes most of the important safety devices used in modern, large compressor stations. As can be seen, the devices used can be classified under headings which denote the substance or element controlled. Thus, there are fuel-supply-pressure regulators, cutouts, and reduced-flow alarms. In the lubricating system there are oil-flow indicators, low-pressure cutouts, high-temperature cutouts, and alarms to indicate dangerous flow, pressure, or temperature conditions. Similar devices for the cooling-water system are also available. For the compressor, bearing temperature and wear indicators, speed indicators and alarms, capacity controls, and torque controls prevent serious mechanical accidents. Gas-flow equipment to measure input to and output from the station, flow between stations, and leaks are a few of the devices commonly used in the gas system.

TABLE 1—SAFETY DEVICES USED WITH GAS COMPRESSORS

Device—	System in which device is used
Pressure regulator	Fuel
Cutout	Fuel
Reduced flow alarm	Fuel
Flow indicators	Lubricating
L.P. cutout	Lubricating
High-temperature cutout	Lubricating
Bearing temperature cutout	Lubricating
High-water temperature cutout	Cooling water
Reduced jacket-water flow	Cooling water
Overspeed cutout	Compressor
Speed indicator	Compressor
Torque indicator	Compressor
Gas-input indicator	Gas
Gas-output indicator	Gas

Gas compressors, by virtue of their size, construction, and cost, all meet certain minimum safety requirements in the speed, lubrication, and cooling-water categories. In other words, manufacturers insist that these devices be fitted to the compressor. Hence, in usual gas-compressor-station design work, it is customary to specify that the compressor be fitted with standard safety devices and permit the manufacturer to meet this requirement as he sees fit. Then the designer concentrates on special safety and control devices which appear applicable to the station under consideration. It is in the choice and arrangement of these latter devices that the designer has a chance to incorporate the desirable features which he feels are necessary for reliable operation of the station.

Station Heating

Most modern gas-compressor buildings are equipped with some type of heating system. Waste-heat boilers are the most common source of steam or hot water in large stations. Smaller stations have been successfully fitted with ventilating fans arranged to draw air over the muffler and muffler tail pipe as shown in Fig. 1. When the exhaust line passes through a long trench in the building, a line housing is unnecessary. The fan simply draws air from the pit and discharges

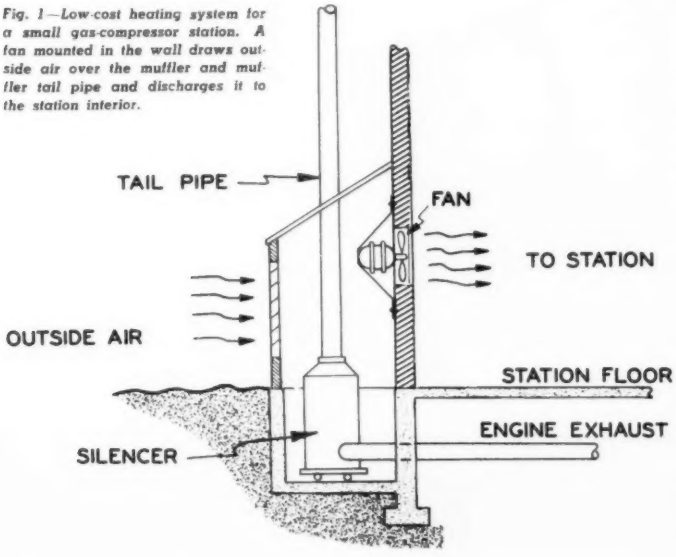

Fig. 1—Low-cost heating system for a small gas-compressor station. A fan mounted in the wall draws outside air over the muffler and muffler tail pipe and discharges it to the station interior.

it to the station building. Steam or hot water generated in a waste-heat boiler provides more even heating of the station building because radiators or unit heaters can be located wherever necessary. Warm air distribution is likely to be erratic if outside doors are opened frequently.

In general, exit-gas temperature from waste-heat boilers should not be less than 250° F. The gas temperature leaving the boiler will be at least 75° F. higher than the water or steam temperature in the boiler if a standard unit is used. Waste-heat boilers do not reduce the efficiency of an engine; in fact some studies indicate a slight gain in engine efficiency after installation of the boiler. Such gains result from the reduction in back pressure when the exhaust gases contract during cooling in the boiler. Waste-heat boilers should never cool the exhaust gases to a temperature below dew point because severe corrosion is likely to result.

Some gas-compressor stations circulate jacket-cooling water through unit heaters after it leaves the engine. Such an arrangement often costs less than a waste-heat boiler but the heating capacity is limited by the maximum allowable temperature from the engine jackets. Hence, during severely cold weather, the interior of the station may be at an uncomfortably low temperature unless the building is insulated, which is not often the case.

Heat in Exhaust Gases

With a full load heat rate of 10,000 B.t.u. per horsepower-hour, about 3,800 B.t.u. per horsepower-hour are exhausted by standard gas engines. Assuming that about 30 per cent of the heat in the exhaust gases can be utilized by reduction of gas temperature to 250° F., about 1,150 B.t.u. per horsepower-hour are available for water heating or steam generation.* This is a conservative value which is often used for quick estimates of heat recovery possibilities. Thus, in a 6,000-hp. compressor station, about 6.9 million B.t.u. per hour would be available for station heating. Diesel-engine heat rates vary from a minimum of about 7,400 B.t.u. per horsepower-hour to a maximum of about 11,800 B.t.u. per horsepower-hour at full and one-quarter loads, respectively. With about 25 per cent of the heat supplied going to the exhaust and 30 per cent recovery of this heat, approximately 900 B.t.u. horsepower-hour are available for waste-heat use.* Thus, it can be seen that the waste-heat recovery possibilities for gas engines are better than for diesel engines when performance approaches the values given here.

Jacket waste-heat recovery for diesel engines amounts to about 3,000 B.t.u. per horsepower-hour. For gas engines, 3,250 B.t.u. per horsepower-hour can be recovered. When full use is made of the heat available in engine jacket water and exhaust, an extremely high over-all usage of the energy in the fuel can be obtained. In addition, if the waste-heat boiler can be operated dry, there is no need for engine silencers because the boiler effectively muffles most exhaust noises. Of course, the values given here are only general, but they are suitable for all preliminary estimates when more accurate data are lacking.

Air Compressors

Most engine-driven gas-compressor units are started by air. Starting air pressures range between 150 and 250 psi., according to the make and size of the unit. Air compressors, being vital equipment, should always be installed in duplicate, one electrically driven unit and one gasoline-driven unit being used. Location of the air compressors in the main station building reduces the length of piping runs but may create crowded operating conditions. Hence, some stations have their starting air compressors located in an auxiliary building.

At least two air-storage tanks

When exhaust gases and engine cooling water are used to heat hot water, quantity of heat available is slightly greater than that given here.

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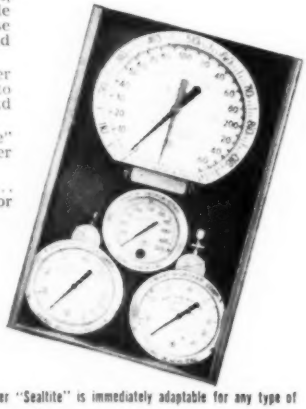

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should be used. Conformance to local, state, or A.S.M.E. construction rules may be necessary, depending on the location of the gas-compressor station. Standard safety devices such as pop valves, pressure gages, drains, and fusible plugs should be specified for all air starting tanks. Although a refinement in design, a condensate separator in the compressor discharge line is helpful in preventing moisture from reaching the storage tank.

Auxiliary Building

Most large compressor stations need an auxiliary building for storage of large replacement parts, space for washroom and lockers, and for an office from which station operation can be directed. In some cases the function of the auxiliary building is extended to that of housing the station generators and air compressors. Wide experience in gas-compressor-station design has shown that an auxiliary building is a good investment for large stations. By its use, operating and maintenance facilities can be centralized with a resulting saving. Even small stations profit by use of an auxiliary building. Therefore, it may be said that except for temporary installations and small, single-compressor stations, an auxiliary building is a worth-while investment, especially where land costs are low.

Miscellaneous Equipment

Thermometers, pressure gages, speed indicators, cranes, log desk, and ventilating devices are a few of the items which may be classified as miscellaneous equipment. Because they might be small, seemingly unimportant, or involve more time than seems reasonable in station design, they should not be neglected. Often, such devices mean the difference between a happy and a dissatisfied operating crew. In general, the more satisfied a crew is with a station, the better the operation that can be expected from the station. Such items as overhead cranes, nonglare lights, and ventilators make the operator's job easier and pleasanter. Therefore, the designer who gives close attention to these small details is generally repaid by station operating records which are creditable.

BOOKS

THE FINANCIAL POST SURVEY OF OILS, 1950 Edition. Prepared by the Financial Post, 481 University Avenue, Toronto, and published by Maclean-Hunter Publishing Co., Ltd. 224 pp. $1.

Besides its individual listings of western oil companies, including data on production, earnings, dividends, property interests, and management, this new survey provides maps of leading Canadian oil fields—Redwater, Leduc-Woodbend, Turner Valley, Lloydminster—and lease maps for both Alberta and Saskatchewan. A section listing inactive and defunct companies brings to over 2,500 the total of companies covered.

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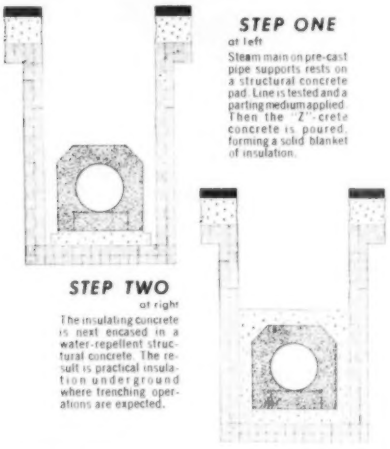

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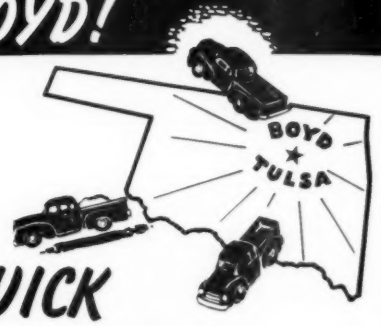

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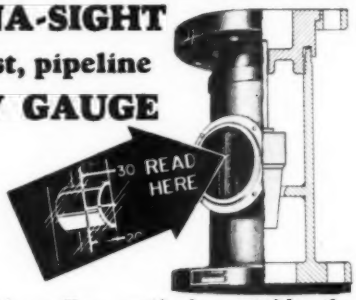

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NEW DISPLACEMENT METHOD OF

Measuring Gas Flow

THROUGH PIPE LINES

by J. C. Wright

THE important thing in determining flow efficiency of pipe lines is to know the "Q" or quantity of gas flowing through the pipe line under prevailing conditions. A new method, described in this article, has been developed whereby this flow can be determined economically, accurately, and quickly by displacement calculations.

During the past, many natural-gas pipe lines were constructed and put into operation without any cleaning except the conventional blowing (which at that time seemed ample for removing skids, rabbits, shovels, and other foreign objects). During this blow, a considerable amount of loose dirt, rust, and mill scale would be removed from the pipe line, but seldom was gas velocity sufficient to remove all of the loose substance, let alone the large amount stuck to the interior wall of the pipe.

Solid welded construction of lines, using internal line-up apparatus, has greatly lessened the possibility of leaving large obstacles in the lines. Also, it is the general practice now to use internal cleaners on gas-transmission lines following completion of construction and previous to placing the lines in operation. By doing this, the problem of maintaining high flow efficiency is relatively easy.

The condition of the interior walls of a pipe line will vary even though the line was constructed of the same type and make of material throughout and constructed by the same contractor in a continuous operation. Some of the things affecting the condition of the interior walls are topography and type of soil in the area, as these influence the amount of dirt, dust, and water which will get into the pipe line during construction, whether the pipe was stored a considerable time or put into the line immediately upon receipt of shipment, weather conditions existing during the construction period, and quality of construction.

J. C. Wright is assistant superintendent of pipe lines, Panhandle Eastern Pipe Line Co., Kansas City, Kans. He has served with Panhandle as welder, district foreman, division superintendent, and superintendent of gas control before commencing present duties in 1947. He has worked with Panhandle and predecessors since 1927.

On lines that were not properly cleaned previous to placing them in operation, the flow efficiency may vary to a great extent; therefore, before a cleaning program can be intelligently initiated, it is important to determine the flow efficiency of the pipe line in question.

Determining Rate of Flow

In the past the Q or rate of flow has been determined with fixed measuring stations where available, and with portable pitot-tube installations where fixed facilities were not available. Check measuring stations on long gas-transmission lines are normally spaced at long intervals and are therefore usually of small benefit in conducting flow tests. Portable pitot-tube installations are expensive in that special taps must be installed at a location where the line has a straight run of pipe for a considerable distance.

A pitot tube previously calibrated by a fixed orifice measuring station has been found to be usually constant for the particular location where calibrated, but it can only be assumed that the same calibration factor is correct at any other location. Also any change in the interior walls of the pipe at the pitot-tube location will materially change the results of the gas measurement. This condition may come about due to cleaning the section of line or by a deposit of foreign matter on the pipe walls.

On long natural-gas-transmission lines, compressor stations are normally placed from 75 to 100 miles apart. For convenience and economy, it is a good practice to conduct a flow efficiency test from the discharge side of the upstream compressor station to the intake side of the downstream compressor station. (Fig. 1 shows a typical setup for this test.) These two compressor stations should operate at constant pressures on the section of line being tested, for a period sufficient to stabilize the flow and pressures previous to the time of testing, and continue to operate with constant pressures during the test. Should this test indicate a low overall flow efficiency, a test can then be made between each main line gate valve to determine if the entire line is low in efficiency or if the condition is confined to areas between certain valves. The setup for this test is the same as shown in Fig. 1 except that deadweight gages and thermometers

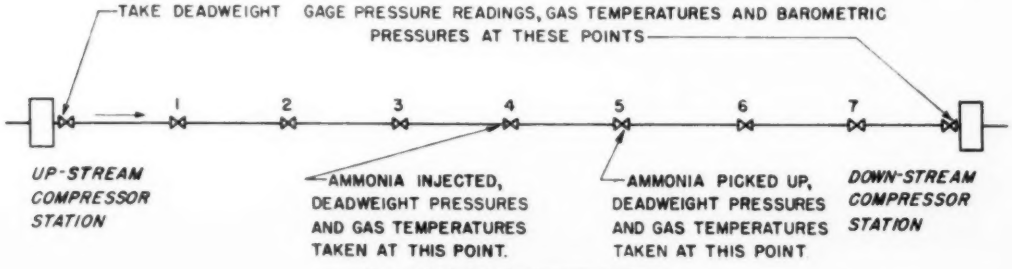
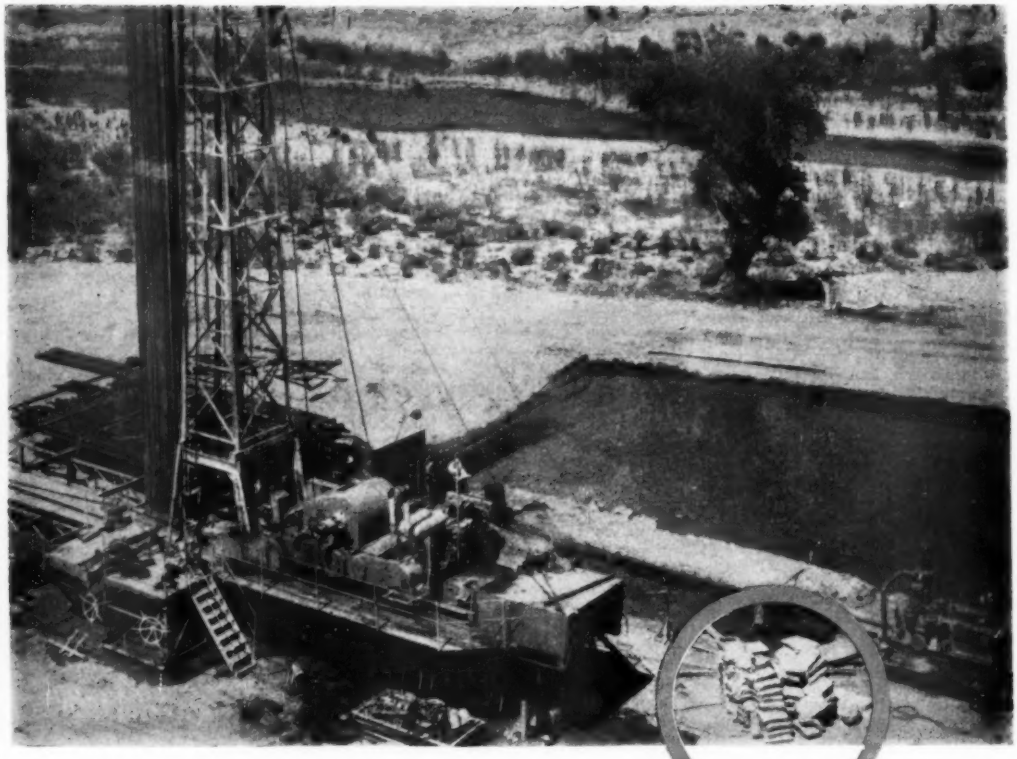

TAKE DEADWEIGHT GAGE PRESSURE READINGS, GAS TEMPERATURES AND BAROMETRIC PRESSURES AT THESE POINTS
1
2
3
4
5
6
7
UP-STREAM COMPRESSOR STATION
AMMONIA INJECTED, DEADWEIGHT PRESSURES AND GAS TEMPERATURES TAKEN AT THIS POINT.
AMMONIA PICKED UP, DEADWEIGHT PRESSURES AND GAS TEMPERATURES TAKEN AT THIS POINT
DOWN-STREAM COMPRESSOR STATION

Fig. 1—Typical section between stations.



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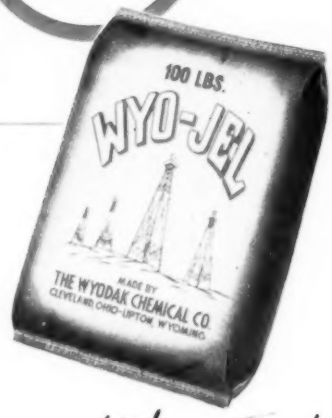

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Tests conducted during the past year have fairly well proved that measurement of gas flow through pipe lines can be calculated more accurately and economically by displacement than by portable pitot-tube settings. The displacement method is conducted by calculating the volume in a known length of pipe line; upstream and downstream pressures, gas temperatures, and barometric pressures are then taken. With these known quantities, the amount of gas in the section of pipe line can be accurately calculated.

Formula

$$Q = V \times \frac{Pm}{Pa} \times Tf \times Fpv$$

where

Q = Quantity of gas in test section
V = Volume of test section
Pm = Absolute mean pressure
Pa = Barometric pressure
Tf = Mean gas temperature factor
Fpv = Supercompressibility factor

Note: The supercompressibility factor was used in the test referred to in this article. The use of this factor is optional.

The next step is to arrive at the time it takes the test section of pipe line to empty and refill itself with a like quantity of gas. To do this, the following method is used. A quantity of ammonia is injected into the gas stream through the blow-off at the upstream end of the section of line. This is done by use of a lubricator. (See Fig. 2.)

By use of a sampling tube (See Fig. 3) located at the downstream end of the section of line, gas is taken from the center of the pipe line and conducted to a piece of filter paper which is kept saturated with methyl red solution. The moment ammonia is present, a discoloration of the fil-

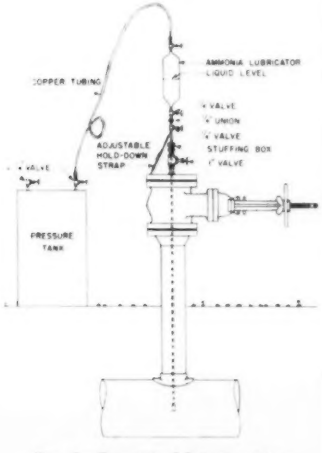

Fig. 2—Ammonia lubricator setup.

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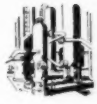

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ter paper occurs. At that instant, the original quantity of gas in the line has been emptied and if no changes in pressures have been made, the section has been refilled with a like quantity of gas.

A stop watch is started the moment the ammonia is injected and stopped at the first notice of discoloration of the filter paper. Dead-weight pressures, gas temperatures, and barometric pressures, which are relative values needed, are taken at the time the ammonia is injected and again at the time the ammonia arrives at the downstream end of the section of line. With the known volume of the section of line and the known time it takes to empty and refill the section, the quantity of gas flowing can be readily calculated. The 24-hour flow rate would be

$$Q = \frac{24}{T} \times V$$

where

T = Time between injection and detection points

V = Volume of gas between injection and detection points

Q = Actual volume passing in 24 hours

The first tests conducted by this method were made on sections of lines where check meters were located at the point samples were taken; results on three different lines check within 0.5 per cent of the permanent measuring stations. The sections of line in each case were approximately 18 miles. During the first test, the elapsed time from the first discoloration of the filter paper until the last trace of ammonia-laden gas passed the sample tube was approximately 5 minutes. In making later tests, the amount of ammonia was reduced and the elapsed time for the slug of ammonia-laden gas to pass the sample tube was from 30 seconds to 3 minutes dependent upon the velocity of the flowing gas.

The length of the slug is determined by the amount of time it takes the ammonia to vaporize and be absorbed into the gas stream. Actually, the length of the slug is of little importance since the time used in calculating the Q is from the time the ammonia is injected to the time the very first trace discolors the saturated filter paper. The following is a typical report of samples taken:

Location	Time	Ammonia present
Gate 205	11:15 a.m.	None
Gate 205	11:16 a.m.	None
Gate 205	11:17 a.m.	None
Gate 205	11:17½ a.m.	Trace*
Gate 205	11:18 a.m.	Strong
Gate 205	11:18½ a.m.	Strong
Gate 205	11:19 a.m.	Weak
Gate 205	11:19½ a.m.	None
Gate 205	11:20 a.m.	None

*Stopped watch. Note: A second watch was used for time after first watch was stopped.

When the ammonia is injected, the pressure on the lubricator must be considerably greater than on the pipe line. This assures quick and complete injection of the ammonia. A quick-opening valve is used to release the charge and a stop watch is started simultaneously with the opening of the valve. This watch can be moved ahead to the location of sampling tube or the exact time transferred ahead if adequate communications are available. In the tests referred to

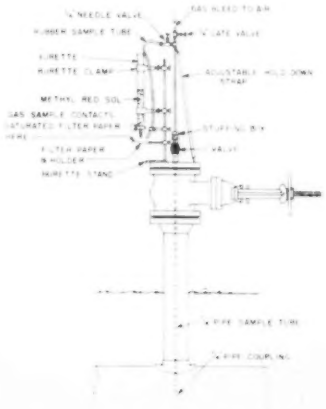

Fig. 3—Method of obtaining sample.

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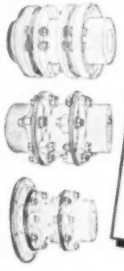

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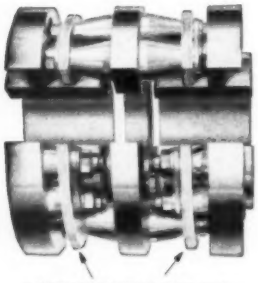

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here, radio communication was used.

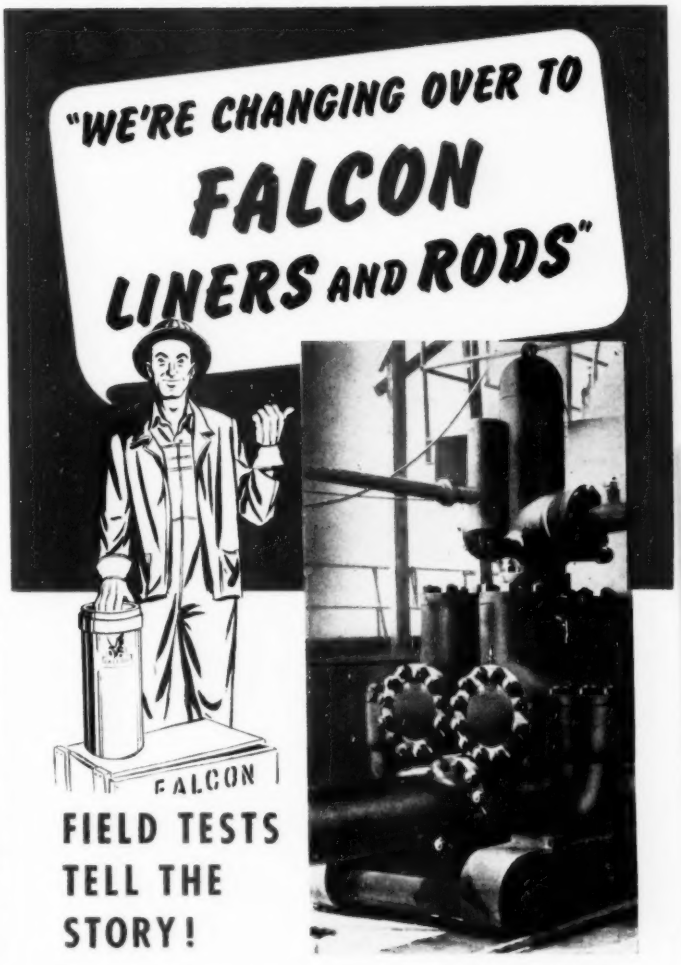
While conducting actual flow test by this method on over 1,200 miles of line, the past year, it was found that best results are obtained when the ammonia is injected into the line at a location where gas temperatures are near stable. This is normally from 25 to 35 miles downstream from a compressor station. However, this distance varies a great deal with ground temperatures and original temperature of the gas when it was discharged into the line at the upstream compressor station. The distance from the point the ammonia is injected to the location of the sample tube can vary, but 8 to 12 miles between these points seems best for normal operating and economical reasons. Multiple-line river crossings, when located in the section carrying the ammonia, will normally cause an error in velocity calculations and a corresponding error in flow measurement.

The ammonia is present in the gas stream near the outside walls of the pipe within a few seconds after it is detected in the center of the gas stream. There appears to be no noticeable molecular action due to the difference in weight of the molecules in the ammonia from those in the natural gas. The ¼-in. pipe injection and sampling tubes can be easily inserted into the line by hand. This was done on lines operating with pressures in excess of 800 psi.

These ¼-in. pipe tubes for injecting the ammonia should be of sufficient length that ammonia will be released directly into the gas stream and the sample tube should be set in such a position that samples are being taken at or near the center of the gas stream.

Velocity calculations made from an estimate of the flow rate will give the approximate time the ammonia will arrive at the sampling tube; therefore it is not necessary to start sampling until just a few minutes before the ammonia is expected to arrive. When sampling starts then, sufficient gas should be bled to the air so there will be no appreciable time lag from the time ammonia enters the sampling tube until it reaches the filter paper. The gas bled is controlled by a ¼-in. valve on top of the tube and a small flow is maintained through the rubber tube to the saturated filter paper regardless of the amount of gas bled to the air.

This method of measuring the quantity of gas flowing through a pipe line requires only a small investment in equipment. No expense for putting taps on the line, provided the line is equipped with blowoffs. If blowoffs are not available, then tests can be made by simply installing 1-in. taps at the locations where ammonia is to be injected and detected. Actual cost of material used in conducting a test is negligible and the number of employes required is held to a minimum.



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New G.C.B. Plant

(Continued from page 77)

poses vary considerably but they all include the need for extremely effective agitation of their fluid contents. This is attained by means of radial-type propellor agitators which, combined with baffles, provide a great degree of turbulence. Combined with the metering arrangements which permit simultaneous addition of several stock oils, this feature permits unusually rapid turnover of batches.

Unit 12 is of considerable interest if for no other reason than the fact that it handles by far the greater proportion of the total output of the G.C.B. plant. Its purpose is to blend Pure Oil Co.'s new Purelube and Puritan motor oils as well as other motor and industrial oils. With it oils may be continuously blended at rates in excess of 200 g.p.m. Blends containing any number of constituents up to and including 7 may be prepared and selection may be made from a group of 16 different ingredients, each supplied from the tank farm by means of pumps and pipe lines completely independent from those supplying other operations.

The heart of the operation is the 7-component metering layout which is supplied from 18 stock tanks in the tank farm and from 8 field blending tanks. The field blending tanks are used to prepare concentrates of the several additives used in the new motor oils. Additives and oils are pumped to the blending tanks and uniform solutions are obtained by mixing with propellor agitators. There are two reasons for using these concentrate or "cutbacks" rather than the undiluted additive by itself. In the first place the proportion of additive in a finished oil is often so low that it is difficult to devise equipment good enough to measure it with sufficient accuracy. Secondly, dispersion of most additives in the finished oil is more easily accomplished if it first is predissolved in a small portion of that oil.

The unit itself consists of seven proportioning meters, a master meter, and an intensive mixer. The proportioning meters are interconnected in such a way that by simple adjustments each meter can be made to deliver oil at any desired ratio of the delivery rate of the meter preceding it in the line. Thus, in order to prepare a blend it is necessary only to know the applicable formula, to make a few simple calculations and adjustments, and to start the pumps; the machine takes care of the rest. Like many modern installations, the blending unit can, in a sense, "think for itself." Not only will it blend a desired quantity of oil and then shut itself down, but it will also shut itself and its supplying pumps down if the proportions fed to it by the operator deviate during the course of the run,

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METALLURGY is a highly important factor in the development of sub-surface equipment to withstand the varying conditions of corrosion, abrasion, temperature and depth. After years of research and field-testing, "Oilwell" offers Sub-Surface Pumps, Sucker Rods, Polished Rods and related equipment; manufactured in a wide range of materials, heat-treatments and finishes to meet all types of well conditions.

Sub-Surface Pumps. In designing sub-surface pumps, "Oilwell" Engineers have consistently held to A.P.I. Specifications and to maximum interchangeability of parts. "Oilwell" and Neilsen Pumps are both divided into two basic types: (1) rod type with either traveling or stationary barrels and (2) tubing types. Either type can be fitted with a large variety of plungers or traveling valves.

"Oilwell" barrels and plungers are of one-piece construction while the Neilsen Pump Division features sectional liner type pumps.

Sucker Rods. "Oilwell" Engineers have developed a complete line of rods which includes numerous grades of carbon and alloy steel to meet specific pumping conditions. All are manufactured to A.P.I. Specifications.

For shallower wells with non-corrosive fluids, "Oilwell" offers rods normalized over their entire length to provide outstanding service at small cost.

To withstand excessive corrosive action and heavy loads, "Oilwell" has designed and developed special heat-treating processes which give toughness, ductility and fatigue-resistance to rods having the proper chemical composition to resist corrosion.

Well-Head Equipment. "Oilwell" Stuffing Boxes, Flow Tees, Polished Rods, Polished Rod Liners, Casing Heads and Tubing Hangers are all made with the careful attention to detail and high precision, characteristic of all "Oilwell" equipment.

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or if the supply of any ingredient fails due to pump or line trouble.

Also associated with the continuous blending units is the battery of ten 200-bbl. surge tanks located in the building and five 3,500-bbl. shore tanks located in the tank farm. Finished oils delivered from the blending units are accumulated in these tanks and later, by individual pumps, are transferred to the various packaging operations, to tank cars and to ships and barges.

Packaging activities in the G.C.B. plant are gathered in the central portion of the first floor of the structure. Packages move in streamlined flow from the empty storage areas at the south end, through the filling stations in the center, and thence to the storage warehouse on the north end of the building. Arrangements differ due to the wide variety of materials being packaged and to the contrasting types of containers in which the materials are put. In general, however, a considerable use is made of conveyors and other automatic and semiautomatic equipment. Small packages, including 25-lb. grease pails, are stored on the second floor and move to the filling stations by means of gravity conveyors and chutes. Drums and other large packages are stored on the first floor and move to the filling locations via powered conveyors.

Greases, being sold by the pound, are packaged with the aid of scales. Stations are available for the filling of 100 and 400-lb. drums, for 25-lb. pails, and for smaller cans. Piping is so arranged that dark-colored products are handled separately from those of a lighter shade. Greases are withdrawn from the kettles by means of rotary pumps—one pump being mounted under each kettle. Each pump is arranged to discharge through a special filter in order that any chance dirt or soap lumps may be eliminated from the packaged products.

Compounded and blended oils are filled in drums by means of volumetric meters. These meters shut off automatically when the desired volume of oil has passed and they also are self-adjusting in that every gallon passed is the equivalent of a standard gallon at 60° F. regardless of the actual temperature of the oil. Oils, as well as greases, are transferred to filling locations from surge tanks or kettles by means of pumps and the products are also filtered against possibility of contamination.

The packaging operations described above all take place on gravity roller conveyors. The packages, after filling and sealing, continue on these conveyors to a point at the end of the storage warehouse where they are stacked on pallets for removal by fork truck to storage, or directly to box cars or ships. Smaller packages are stowed on the pallets by hand but the larger one are loaded with the aid of electric hoists.

A considerable proportion of the output of motor oils is filled in the usual 1 and 5-qt. cans. This is done on two similar canning lines equipped with the usual automatic filling and packaging machinery.

The pallet-loading machine, or palletizer, is a rather remarkable piece of equipment. Three separate conveyor lines feed into it carrying the two types of motor-oil cartons and grease cartons as well. The machine automatically stacks the cartons on pallets handling the three types of packages simultaneously. The completed pallet contains a different number of cartons in each instance with the loads cross-stacked for stability. All that needs to be done is to feed the machine occasionally with empty pallets and to remove filled pallets as the machine ejects them.

Transportation of packaged products from the refinery to the field involves all types of carriers—motor truck, box car, river barge, and ocean tanker. To assist in these movements, the G.C.B. plant employs the pallet-fork truck principle of materials handling. The trucks used are gasoline powered and will carry loads in excess of a ton. This method of materials handling is extremely flexible compared to a fixed conveyor system; the tiering feature permits use of building space that is ordinarily wasted; it is efficient because packages can be transported in unit loads of from 4 to 50 pieces instead of handling each piece separately.

As a further aid in shipping, the G.C.B. plant makes use of tractor-trailer trains, particularly when ships and barges are being loaded. The trailers, each capable of carrying two loaded pallets, are drawn to ship-side in trains of up to 10 or so by means of electric tractors. Box cars are loaded by means of the fork trucks which deposit the pallets in the cars in order that they may be unloaded and their contents stowed.

Since most of the box cars leaving the plant contain mixed loads involving all sorts of packages, the ladings must be firmly strapped and braced. In order to provide the dunnage required for this purpose a small shop is available.

In addition to movements of packaged materials, considerable volumes of lubricating oils leave the plant in bulk form. Tank cars are loaded at a loading rack which will handle seven cars at one time. Loading of ships or barges is accomplished at two locations on the wharf. In both cases stock oils are loaded from tank-farm storage tanks and blended oils from the five shore tanks at rates approaching 1,000 bbl. per hour.

The G.C.B. plant has now been substantially in full operation for 6 months. During that period problems have been many.

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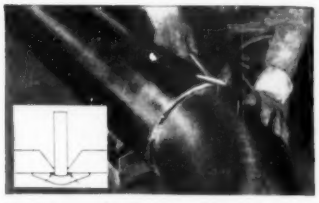
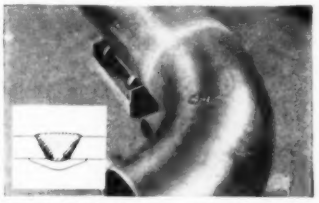


Tacking completed, spacer pins are knocked off and the welder finishes his joint. Insert shows cross-section of ring and joint.



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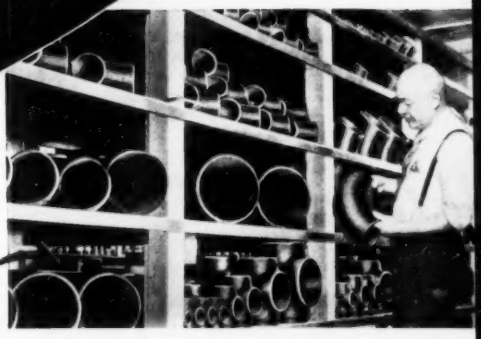

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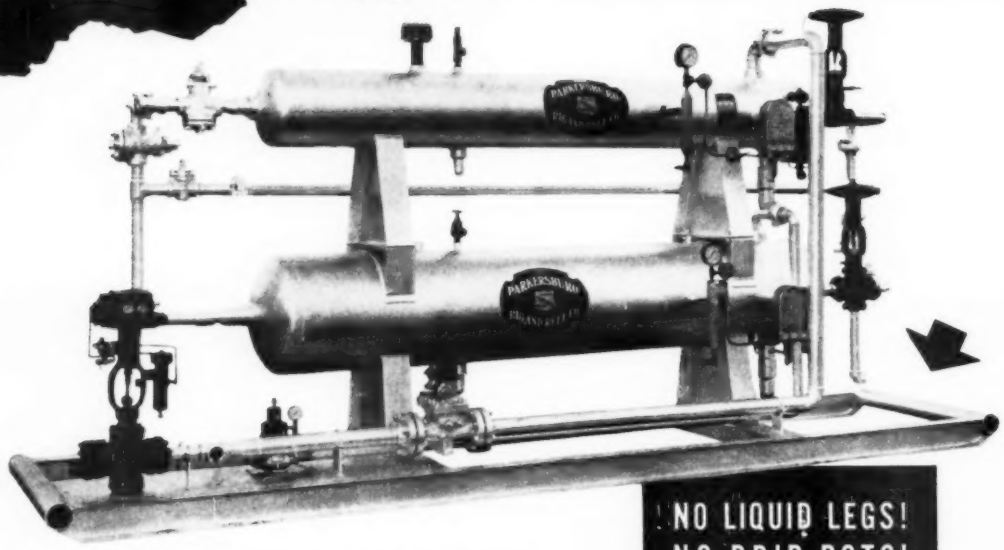

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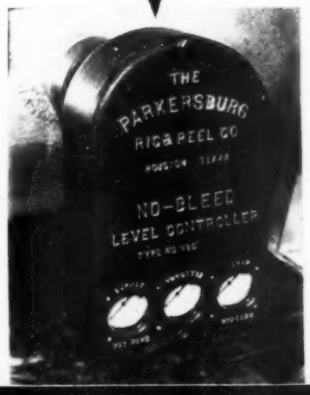

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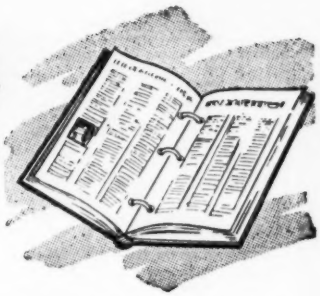
The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Temperature Measurement And Control

IN discussing lag in a controlled system (March 9 installment) it was stated that this depends on the system capacity, resistance, and dead time. The word lag was used in a general sense. The term "dead time" (also called "transportation" or "velocity-distance lag") is meant to designate specifically a direct time delay.

Dead Time

Referring back to the example of a reboiler-fractionator system used in the previous discussion, consider a thermocouple or thermometer bulb located at a given number of trays up the tower. Dead time would then be that elapsing before a change in the temperature of the vapor leaving the reboiler is detected by the primary measuring element. This time interval depends on the velocity of the ascending vapor and the distance between the thermocouple or bulb location and the reboiler. The change in vapor temperature will not be recorded or acted upon by the controller until this time interval has passed.

Associated with dead time is transfer lag in the column. In effect, the trays may be considered as thermal capacities while separate resistances to flow of heat exist between the trays. The effective over-all lag for the complete control circuit thus depends on these individual capacity and transfer lags in the column and the transportation lag. The process lag in the reboiler, mentioned previously, must be considered. In addition, regardless of the location of the primary measuring element, a measurement lag exists. This—variously known as response or sensitivity of the primary measuring element—assumes special importance when considering measurement and control of temperature.

Temperature Measurement

Being closely related to control of product quality, temperature is probably the most important single variable measured and controlled in the refinery. While primary measuring elements may range from bimetallic strips to optical and radiation pyrometers the important devices for refinery use are bulb-capillary thermometers and thermocouples.

Basis for selection.—Most important considerations in selecting the primary element for temperature measurement are: (1) cost, (2) range and accuracy required, (3) speed of response, (4) over-range protection, and (5) location of bulb or thermocouple relative to recorder or controller.

Measurement Lag

Factors affecting performance of the primary element are (1) design and metallurgy of the protecting well or tube, (2) construction of lead wires or capillaries, and (3) resistance to corrosion at operating temperature. Measurement lag has been mentioned and this can be a serious problem for both thermocouples and thermometer bulbs. Analysis of measurement lags shows that heat capacity and surface area of the couple junction or bulb, rate of change in temperature being measured, and velocity of fluid stream are involved, as well as the temperature drop across the air film between bulb or couple junction and protecting tube or well. This means that attention must be paid to proper location of the measuring element in the fluid stream or process equipment and in selection of the protecting tube.

Temperature Control

In the previous number of the Refiner's Notebook temperature control of fractionating towers was discussed. It was indicated that where exact control is not necessary this could be accomplished by using a temperature controller to operate a motor valve on the steam inlet to the reboiler heater. The primary measuring element could be located in the vapor return line from reboiler to column or in the column itself. For narrow-range fractionation where closer control is required, the temperature controller can be used to reset a flow controller operating the motor valve. Another modification would be to replace the flow controller with a second temperature controller. By using two thermocouples located a given number of plates apart in the column, as determined by the temperature and composition gradients in the tower, a differential temperature control is established.

Fig. 1 indicates conventional temperature measurement and control on the outlet of an oil furnace. The temperature controller resets a locally mounted flow controller operating the motor valve on the fuel line. If it were desired to balance the heat transfer between the two cells of the heater, couples could be located in each coil to measure temperature differentially. The thermocouple leads would be connected to a differential temperature controller operating individual motor valves, through relays, in the inlet lines to each coil.

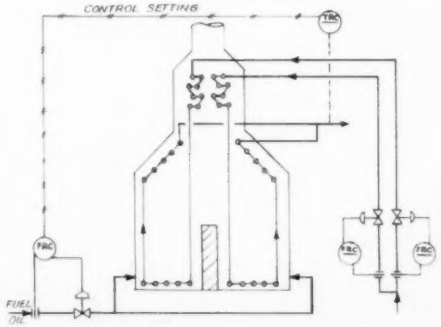


Fig. 1—Temperature measurement and control on furnace. With interconnected control as indicated, motor valve on fuel line is set by flow controller responding to change in fuel pressure, before outlet furnace temperature has deviated from control point.

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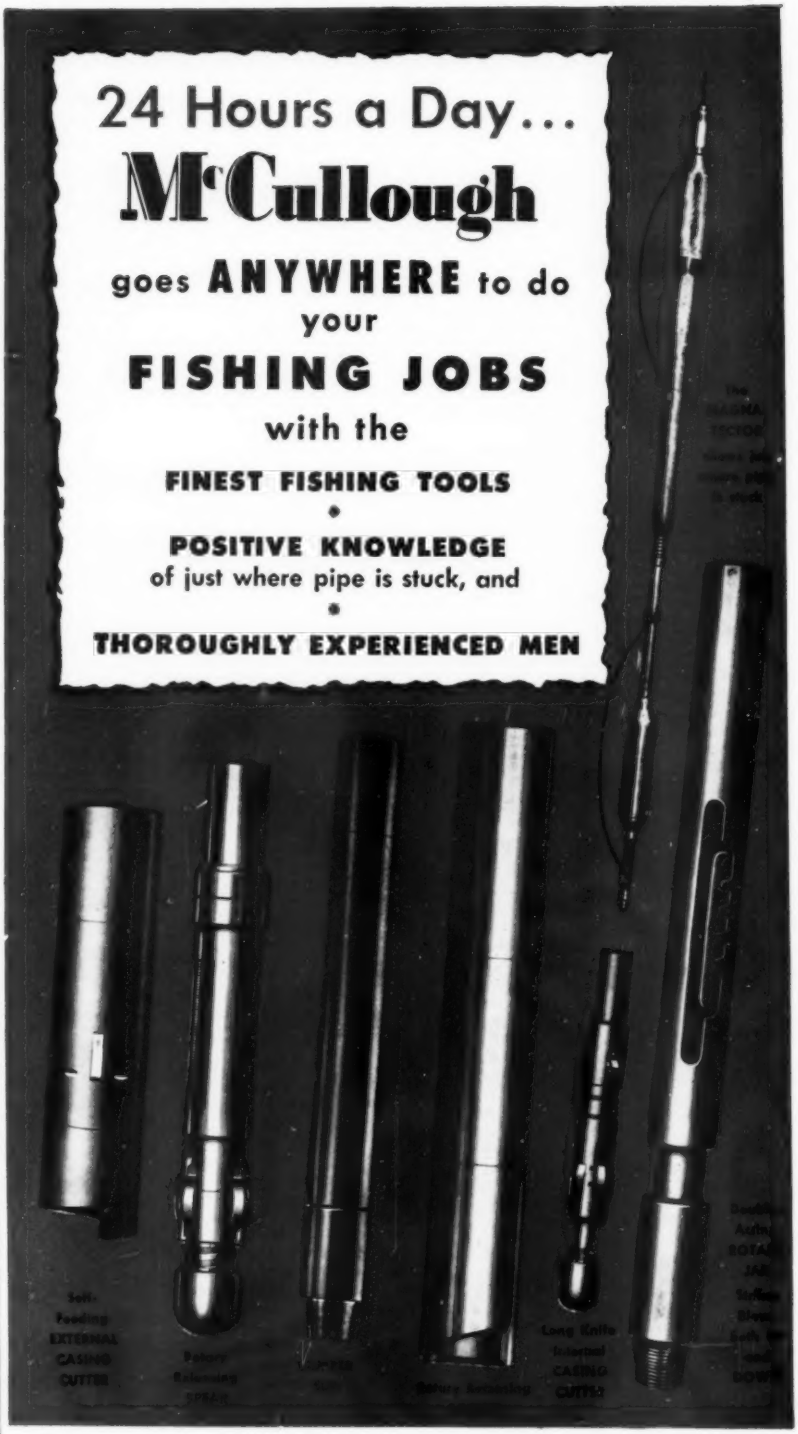

ENGINEERING *fundamentals*

Changing Well Capacity by Fluid Saturation Change

THE change in well capacity by increasing or decreasing permeability in the formation around the well bore was discussed in Engineering Fundamentals No. 395. Because the permeability to a given fluid is dependent upon the fluid saturation as well as upon the rock permeability, it is possible to increase or decrease well capacity by a change of fluid content. This has been noted previously (Engineering Fundamentals No. 345) as one of the factors contributing to the decline of oil productivity index on a solution-gas-drive reservoir.

The degree to which flow capacity can be changed by changing fluid saturation will depend upon the relative permeability characteristics and capillary properties of the formation. For example, in a formation to which the relative permeability curve in Fig. 1 applies, a reduction in water content from 58 to 40 per cent would mean an increase in flow capacity to oil of 200 per cent. In this same formation, however, reducing the water content below 35 per cent would do little toward increasing flow rate.

Removing one fluid from the pores of a formation involves replacing it by another. In oil-producing wells this means an increase of oil saturation and a decrease in gas and/or water saturations. In gas wells or gas injection wells it means an increase in gas saturation and corresponding decrease in liquid hydrocarbon and/or water saturation. In water-injection wells it means an increase in water saturation and a corresponding decrease in gas or oil content.

The maximum benefit would be derived by changing fluid saturation throughout the entire formation. Any effect that can be achieved, however, is generally limited to that volume immediately adjacent to the well bore. It is within this region that a reduction in permeability contributes most to flow resistance. The undesirable fluid in the region adjacent to the well bore can be removed by displacing it into the well bore or by moving it further into the formation. If the former is done no further thought need be given to the undesired fluid. If the latter, a consequence will be an increase of the fluid within the formation further and one must then consider the balance between radius effected and the magnitude of the effect in order to determine whether the over-all change is beneficial. It is generally believed that pushing an undesirable fluid further into the formation has an over-all beneficial effect on rate.

In generai it is easier to remove the undesirable fluids in the direction of the natural pressure differential, i.e., in producing wells remove them to the well bore and in injection wells push them on into the formation. It may under some circumstances be feasible to reverse this process. By oil injection the water surrounding the bore hole of a producing well can be pushed to a point further into the formation where its effect upon flow will not be so great. In water-injection wells backflowing sometimes removes small quantities of oil.

In oil wells a considerable amount of water may be present, around the well bore particularly, because of invasion during drilling operations, or infiltration due to faulty mechanical equipment. To produce this water into the well bore involves breaking down whatever mechanism holds the water in place, usually capillary forces. Capillary forces can be reduced by a change in interfacial tension or by a change in contact angle between the fluids and formation. Capillary forces can be partially overcome, even if not reduced, by the application of a higher pressure differential. The former concept leads to the injection of additives into either the oil or water phase. These additives may be primarily wetting agents or detergents which produce both a lowering of interfacial tension and change in contact angle. Swabbing a well is one means of increasing the pressure differential in order to overcome capillary forces across a water bloc.

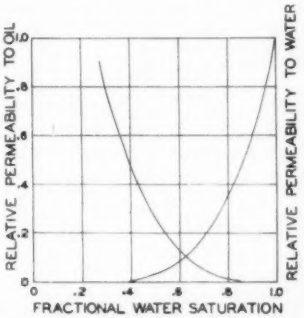

Fig. 1

Removing water from the formation in a gas well can be accomplished by the same techniques. In addition, water removal has been accomplished by a vapor-pressure lowering process[1]. This procedure calls for the injection of a high-vapor-pressure material, such as acetone, ethyl alcohol, or gasoline. Upon release of pressure to promote flow following such fluid injection there is a favorable evaporation of water from the formation.

In gas wells of the condensate type the maintenance of a favorable gas saturation is accomplished by keeping the formation at a sufficiently high pressure so that liquid hydrocarbons will not condense.

In water-injection wells the removal of undesirable oil saturations can be accomplished by the use of chemical additives which reduce capillary forces and permit the oil to be moved by the applied pressure differential further into the formation. Gas saturation is ordinarily removed by solution or compression under the application of high injection pressures.

There may also be instances where the flow capacity of one fluid may be increased by changing the saturation of another fluid. For example, in three-phase flow (oil, gas, and water) the permeability to gas may be decreased and that to oil increased by the increase in quantity of water present. This degree of variation is, however, limited. This particular saturation change has been suggested as being of benefit in gas-drive projects.

Reference

1. The Rehabilitation of Drowned Gas Wells, S. T. Yuster, A.P.I. Drilling and Production Practice, 1946.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

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2 CLASS VL BENT TUBE BOILER gives details and designs of actual installations of a boiler particularly adaptable to limited space conditions. Also illustrates valves and fittings, heat-transfer equipment, and process equipment. *Henry Vogt Machine Co.*

3 V-BELT DRIVES, a 20-page data book, presents selection charts on single-groove drive table in fractional-horse power applications, horsepower ratings, pulley size and speed, belt length, and drive. *Rockwood Manufacturing Co., Inc.*

4 DURABLA PUMP VALVE SERVICE covers a description of metal pump valve service for any type of reciprocating pump, air compressor, gas compressor, and gas engine. *Durabla Manufacturing Co.*

5 LONG LIFE FLEX-CORD ROTARY HOSE, a multicolor brochure emphasizes factory maintenance for reconditioning damaged and worn rotary hose. Step-by-step operations in repairing hose are illustrated. *Goodall Rubber Co.*

6 IMPROVED LINE TIGHTENER describes a safety device with interchangeable brass liners that will allow about 6,000 ft. of line to be spooled tight on the drum before wearing out. *Sunshine Iron Works.*

7 KINNEY PLUG INJECTOR describes equipment and method of removing paraffin from flow lines at reduced cost. The method, which involves no shut down, consists of inserting a soluble plug in the flow line through a specially designed valve. *Kinney Machine & Manufacturing, Inc.*

8 PATENTED ROUND KELLY DRIVE, a two-color brochure describes the applications of the round kelly drive that fits standard master bushing on any rotary table, for use when drilling in under pressure. *Miether Machine Works.*

9 MATERIAL HANDLING ACCESSORIES. A 28-page catalog, Bulletin 1129, covers new material-handling equipment such as drum handlers, rams, scoops, side-shift carriages, and revolving arms. *Hyster Co.*

10 CARRY-ALL SERVICE BODY. An all-steel, all-purpose body for mounting on light trucks. The carryall body can be easily equipped with accessories such as pole derrick, support jack, and winch. *Morrison Steel Products, Inc.*

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pipe couplings, this 20-page catalog describes rotary and cementing and circulating hose, mud-mixing gun, and a circulating head, all of which incorporate the swivel pipe coupling. *Gil-Lair Products, Inc.*

12 CATALOG INSERT SHEETS. This set of engineering drawings and data sheets are prepared for insertion in the firm's CE-47 catalog. New sheets include material on mechanical-draft cooling towers, multifin cooling units, mechanical equipment, wood tanks and specialties, engineering and general information, and stainless-steel products. *Santa Fe Tank & Tower Co.*

13 OIL FLUORESCENCE DETECTOR. This pocket-size folder emphasizes the distinctive features of Rotary's Portable Fluoroscope which operates on either a.c., d.c., or 6-volt battery, and which is adaptable to use at the well or in the laboratory. *Engineering & Manufacturing Co., Inc.*

14 HEAT INSULATION, an exceptionally well-prepared, 58-page book, presents concisely, details and technical data on industrial insulation and methods of application. Insulation materials covered are: 85 per cent magnesia, asbestos, Newtempheit, Nicolite, Newallite, and spun glass. These materials are offered in slabs, blankets, sheets, mattresses, and in shaped sections for pipes, valves, and flanges. *Newalls Insulation Co., Ltd.*

15 LOW-COST EXCHANGERS. The bulletin describes the Type SSCF all-stainless-steel exchanger and the Type BCF exchanger made of nonferrous material. Both types are built in surface areas from 1 2/10 to 125 sq. ft. They are particularly adaptable to engine jacket water and lubricating-oil cooling. *Ross Heater & Manufacturing Co., Inc.*

16 DESIGN - ENGINEERING - FABRICATING. A detailed engineer's treatment of bubble - tray and cap design, this 26-page, multicolor book illustrates truss-type trays and caps for every process requirement and includes sections on planning, designing, engineering, fabricating, specifications, installation, and operation. In the specification section are tables dealing with bubble cap and riser comparison data for various ratios of related areas, bubble cap and risers types and holddowns, and a complete selection of bubble-cap and riser designs. *Fritz W. Glitsch & Sons, Ltd.*

17 TAG FULLY AUTOMATIC CONTROL for saturation control of natural gas, a new 12-page catalog describes the saturation controller, a recording and controlling instrument which operates on the psychrometric wet and dry-bulb principle. It automatically regulates and maintains the wet-bulb (relative humidity) depression for which it is set, regardless of variations in the dry-bulb gas temperature. *Weston Electrical Instrument Corp.*

18 ARC WELDING MACHINE CATALOG. The 36-page, illustrated catalog is divided in two parts, the first dealing with a.c. arc welders, the second with d.c. machines. The descriptive text gives distinctive features, operating data, specifications, and other pertinent information about each machine. *Airco Co. International.*

19 STEEL AND ALLOY PLATE FABRICATION. Designed mainly for engineering personnel, this brochure offers a pictorial story of the fabrication of steel and alloy tanks and pressure vessels. Stainless steel, Monel, nickel, copper, aluminum, Hastelloy, and clad steels are among the corrosion resistant alloys presented. Also of special interest are comprehensive corrosion data charts. *Nooter Corp.*

20 IMO-DE LAVAL WORM GEAR SPEED REDUCERS. The bulletin contains a complete description of standard IMO-De Laval horizontal worm-gear speed reducers. It shows all available types and gives standard specifications. It also contains complete horsepower-rating tables, overhung load ratings, dimension tables, and information on how to select worm gears. *De Laval Steam Turbine Co.*

21 INSTANTANEOUS HOT WATER HEATERS AND HEAT EXCHANGERS. Illustrations and descriptions of the firm's products are a minor part of this 36-page, 2-color book. It illustrates typical piping arrangements and presents selection charts for two, four, and six-pass heaters in steam capacities to 100 lb. *Patterson-Kelley Co., Inc.*

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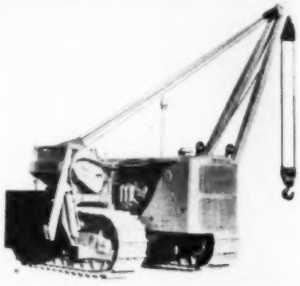
OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

by Dan B. Miller

22 TRACKSON SUPER-INCH SPECIAL PIPE LAYER was developed especially for handling the heaviest super-inch pipe used in today's pipe lines. It has the speed, power, lifting capacity, and precision controls necessary for setting the fast pace prevalent on modern pipe-laying jobs. The MDW8 pipe layer is ideal for the cleaning, doping, and raising gang, as well as for the lowering-in crew. It can work far enough from the ditch to minimize cave-ins. Its lifting capacity is obtained by a specially built 92-in. gage, offset track D8 tractor, together with a hydraulically controlled counterweight which can be extended quickly for maximum lift and retracked when working in tight places. *Trackson Co.*

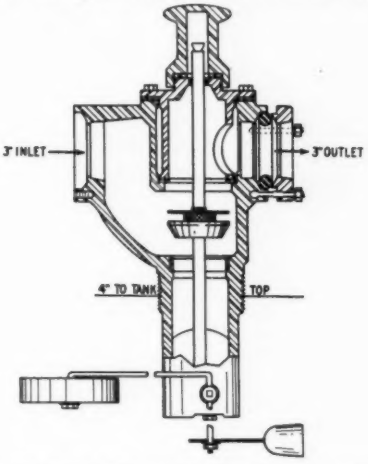


IT'S NEW ✓ CHECK IT

23 IMPROVED MAGNA-SIGHT FLOW GAGE. The unit consists of a short body, with flanged or screwed pipe connections, which accommodates a fixed orifice in the lower end. A tapered metering plug rises and falls with fluid flow rate in accordance with variable area metering principles. The metering plug carries a permanent magnet, and a hollow, cylindrical, soft-iron follower rides in an external slot. Covering the slot is a plate on which is engraved a scale calibrated either in gallons per minute of in millimeters. The position of the follower relative to the scale indicates flow rate. Available in brass, bronze, iron, steel, and type 316 stainless steel; in sizes from ¾ to 4-in., and with maximum capacities from 3.5 to 250 g.p.m. Temperatures up to 400° F. and pressures up to 500 psig. can be accommodated. *Fischer & Porter Co.*

IT'S NEW ✓ CHECK IT

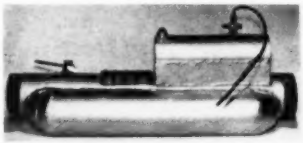
24 GUYTON POPPET-TYPE ROUTING VALVE for field storage tanks is a semiautomatically operated valve for loading a battery without manual attention,



and at the same time eliminating the fire hazards of overflowing tanks. The Guyton routing valve comes in two sizes, 2 and 3-in., with two types in each size; one for sweet and one for sour-gas service. The valve body is high-grade cast iron while all internal valve parts are made of neoprene or stainless steel. The internal float is foamglass and the complete float assembly is easily installed through an 8-in. thief hatch located approximately 14 in. from center of valve. *Murdock Tank & Manufacturing Co.*

IT'S NEW ✓ CHECK IT

25 AUTOMATIC TANK SHUT-OFF VALVE. Tank is automatically shut off when empty and before air can get into the suction line. As the fluid level goes down, the float in the chamber drops and trips the trigger work causing



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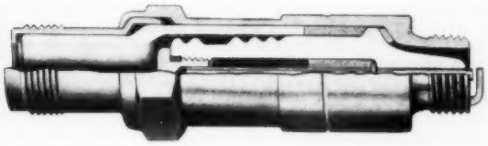
the valve to move horizontally to a closed position. In normal operation, before the tank is empty, the fliud is bypassed around the two sides of the body giving more than a 4-in. fluid column. When placing the valve in operation, air in the float chamber is bled off by the pet cock shown at the top of the illustration. The valve is manually set by the handle near the outlet. Trigger mechanism is easily accessible through plate bolted on the barrel. *Roberts Pipe & Supply Co.*

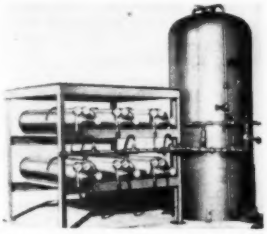
IT'S NEW CHECK IT

26 SHIELDED SPARK PLUGS. The unique feature about the new shielded spark plug is that the design permits the exact duplication of heat range and performance of corresponding unshielded spark plug. Chief advantage is found in its low fire hazard where explosive fumes may be present. Another feature is the resistance to moisture in exposed installations. With these two characteristics, the shielded spark plugs permit the complete elimination of high-frequency interference provided the rest of the ignition system is also shielded. Accidental shorting and flashover due to dirty or wet insulators are eliminated with this design. *Champion Spark Plug Co.*



IT'S NEW CHECK IT

27 STATIONARY FIRE-FIGHTING UNITS. These units are being built in 500, 1,000, and 2,000-lb. capacities. They are designed to protect wide areas where a minimum of manpower is available such as gasoline bulk plants, gasoline-storage areas, refineries, petroleum and natural-gas fields, large chemical plants, liquefied petroleum gas tank farms, and other major public-utility hazards. One person can operate the stationary unit and fight a fire in any portion of an area several acres in size. *Ansul Chemical Co.*

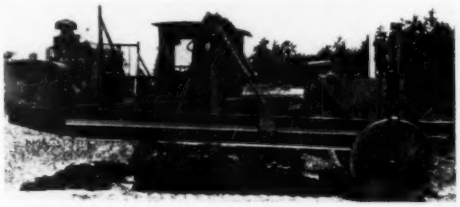


IT'S NEW CHECK IT

28 NONGLARE-TYPE ALUMINUM PIGMENT for painting tanks, buildings, piping and other petroleum process equipment as well as industrial interiors, was designed for the purpose of suppressing the specular characteristic of the usual aluminum pigment and to yield films with a suppressed metallic gloss approaching as close to a white pigment as is currently possible to obtain with a metallic pigment. Due to a minimum of highlighting and the resulting elimination of irregularities in appearance due to overlaps in brush application, the use of MD-565W pigment is highly effective in the painting of large surfaces. High insulating properties of MD-565W Aluminum Paste particularly recommend this product to the petroleum industry where 2 to 3 per cent surface reflectivity is of definite importance, particularly in the storage of highly volatile petroleum products. *Metals Disintegrating Co., Inc.*

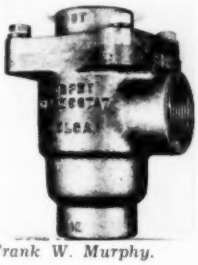
IT'S NEW CHECK IT

29 BUSHWACKER, a mowing machine for trees, weighs 14 tons, is mounted on a crawler-tractor unit, and is powered by a 168-hp. diesel engine. It is 10 ft. wide, 21½ ft. long over-all, and clears a swath 6 ft. wide at a speed of about 1½ m.p.h. In one pass over a densely wooded area, trees up to 8 in. in diameter and all undergrowth are reduced to small fragments and deposited upon the ground. Topsoil is not disturbed. Regrowth is retarded due to the fragmentation of trunk fibers at the root junctures. Practically all types of native growths have been cleared, including oak, maple, hickory, pine, willow, palmetto, honeysuckle, bullbriars, and other noxious growths. *American Steel Dredge Co., Inc.*



IT'S NEW CHECK IT

30 MURPHY REGULATOR. This engine-temperature regulator was designed for field installation on both horizontal and multicylinder oil-field engines with atmospheric cooling systems. Particularly adaptable where sour gas is eating up engines because of low temperatures. Regulator bypasses water back to engine until it reaches proper temperature. Bypass then closes to divert water to cooler, assuring constant, even temperature without hot spots. Interchangeable thermostatic elements are the only wearing parts and can be easily replaced at low cost. *Frank W. Murphy.*



IT'S NEW CHECK IT

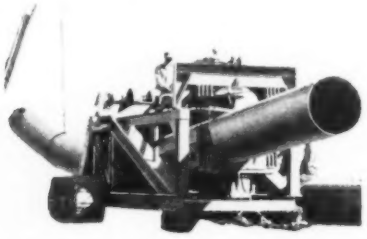
31 NEW GASOLINE GAGING PASTE for the oil gager has been developed as a companion product to manufacturer's water finding paste. New paste gives oil industry more accurate gages of lighter hydrocarbons. Kolor Kut gasoline paste turns red instantly on contact with light hydrocarbons and especially light crudes. A small amount of paste is spread on gage line or rod where surface of gasoline or light hydrocarbons is expected. Paste will not creep up the gage line and therefore gives a truer gage. *Kolor Kut Products Co.*

IT'S NEW CHECK IT

OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

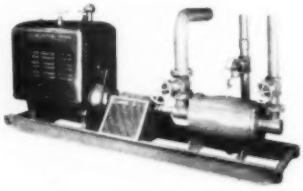
32 CABLE-POWERED PIPE-BENDING MACHINE bends all sizes of thin-wall pipe, as well as pipe as big as 30-in. o.d., with ½-in. wall thickness, in a vertical



plane. Measuring the degree of bend is made easy and accurate by bending in a vertical plane using a level or bubble-type protractor. Simply determine the level reading of each end of the pipe, add the readings, and the result is the degree of bend. This machine will bend pipe within 4 ft. of one end and within 10 ft. of the opposite end of the pipe. Large-diameter pipe can be bent with a high degree of smooth bend, and can be bent without "beefing" the frame. Mounted on Athey tracks, a truck can easily move the bender over rough terrain. With tracks dismounted, it can be readily hauled on a standard truck float. Weight is 25,000 lb. *Crutcher-Rolfs-Cummings.*

IT'S NEW — CHECK IT

33 DRILLING-MUD DESANDER. The machine employs the use of a plurality of impellers mounted on the same shaft and rotating at the same speed. This arrangement serves to pump mud from the pits or tanks and to discharge desanded mud to a reservoir for pick-up by slush pumps. It is mounted on steel skids and can



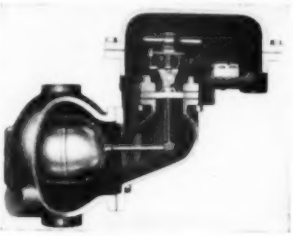
be placed anywhere up to a distance of 50 ft. from the mud pits. Delivers 350 g.p.m. of desanded mud at 1,400 r.p.m. and 300 g.p.m. at 1,200 r.p.m. Desander requires 55 hp. at 1,400 r.p.m. and a 100-hp. prime mover is recommended. Medium-viscosity mud entering the desander with a sand content of 8 per cent can be reduced to 0.5 per cent, on a volume basis of 300 g.p.m. *Apex Machine & Manufacturing Co.*

IT'S NEW — CHECK IT

34 SUPER SCOTTSONIZING is a method of hardening stainless-steel machine parts requiring precision tolerance up to .0002 in. It gives these parts a case of .002 to .003 in. with a Rockwell reading of 68 to 70 C. Stainless steel processed in this manner becomes hard enough to scratch a diamond and will cut ordinary glass. While the case depth is light, it has exceptional wearing qualities. In one application this method increased the life of a stainless-steel piston in aqua ammonia pump service from 180 days to at least 1,145 days. The piston is still operating. *C. U. Scott & Son, Inc.*

IT'S NEW — CHECK IT

35 NO. 65 ELECTRIC CONTROLLER, a new, explosion-proof float-operated electric controller for water tanks, receivers, and other liquid-storage systems can be used to make or to break electrical circuits at either high or low levels. No. 65 has been Underwriters' tested and approved for use under the following hazardous conditions: Atmospheres containing ethyl-ether vapors,



ethylene, or cyclopropane, gasoline, petroleum, naphtha, benzine, butane, propane, alcohols, acetone, benzol, lacquer-solvent vapors, or natural gas. This float switch incorporates packless construction, heavy-duty mercury switch, and totally enclosed wiring and terminals. It is furnished with a standard switch that breaks the circuit with falling liquid level, but a reverse acting switch is available for completing the circuit with falling level. *McDonnell & Miller, Inc.*

IT'S NEW — CHECK IT

36 DOMOR, a one-man self-propelled elevating grader, has been developed by Ulrich Products Corp., in cooperation with Caterpillar Tractor Co. In making the conversion the standard blade, circle and drawbar of the motor goods are removed and the elevating carrier adjustably supported under the main frame. A 30-in. disk plow is drawn by a plow beam attached to the standard

drawbar connection. The 42-in. carrier is driven by power takeoff from the motor grader engine and has a normal speed of 400 ft. per minute. It is equipped with a four-ply corrugated top conveyor belt, firmly connected by metal hinges. An efficient, auger-type pan cleaner is driven by well-protected gears. *Caterpillar Tractor Co.*

IT'S NEW — CHECK IT

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including offsets in ½ and ¾-in. rigid, EMT thin wall, or aluminum conduit. No guesswork, no special adjustments are necessary; it has a measuring gage and bend-degree indicator to control precision bends made by inexperienced workmen on the job. Especially recommended for use in open or slab work, or any other job where small or large numbers of bends are required. *Tal Bender, Inc.*

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(B)

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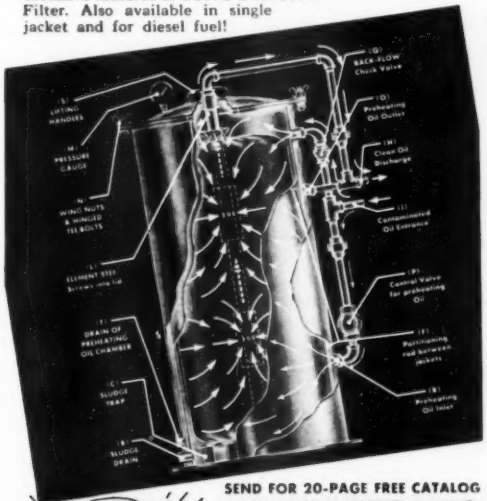
You save because SUN Filters *refine* lube oil as they filter! Cross-section below shows many exclusive features of SUN'S Dual Flow Filter. Also available in single jacket and for diesel fuel!


(G) BACK-FLOW Check Valve
(O) Preheating Oil Outlet
(H) Clean Oil Discharge
(I) Contaminated Oil Entrance
(P) Control Valve for preheating Oil
(J) Perforating rod turnover jackets
(R) Preheating Oil Inlet
(E) LIFTING HANDLES
(N) PRESSURE GAUGE
(M) WING NUTS & HINGED TIE BOLTS
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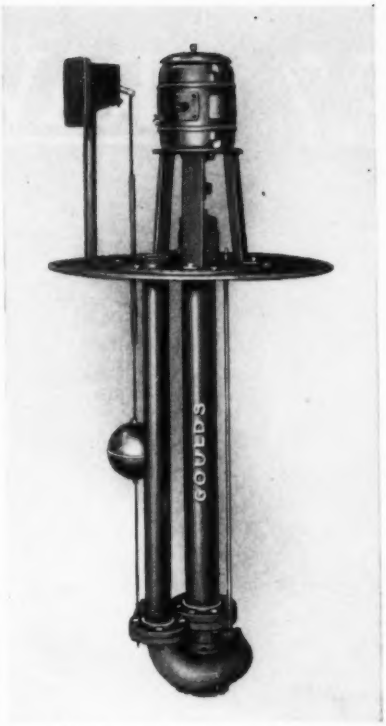

Goulds vertical centrifugal Fig. 3047

For Dependable Heavy Duty Sump and Drainage Service

This rugged, heavy duty sump pump gives exceptional service in removing water from boiler room pits, pipe tunnels, elevator pits, cellars, basements. It is also widely used for transfer service where automatic control of liquid levels in vats or tanks is required.

CAPACITIES Fig. 3047 is available in four sizes for pit depths from 3 to 20 feet. Capacities from 10 to 650 G.P.M. with heads up to 130 feet depending upon capacity.

ADVANTAGES The unit comes complete with float, automatic switch and cover plate. The discharge pipe, pump support column and the cover plate are welded into a rigid unit assuring permanent alignment of upper and lower bearings. Lower bearing is protected by special pressure equalizing system to give long wear.

For complete information call or write Pump Headquarters or your nearest Goulds dealer. Ask for Bulletin 726.1.

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Seneca Falls
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127 GRAVER TANKS

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CITIES SERVICE
COMPOUND PLANT

Aerial view at top shows tank farms with lube oil plant under construction. Inset shows some of the 84 tanks and kettles being installed inside the building.

● *Capacity* 50,000 gallons of "heart-cut" oil per day... *Area* 42 acres... *Cost* four million dollars ... *Equipped* to blend solvent-refined base stocks into a super-quality motor oil. That's the new Cities Service oil compounding plant now under construction at Cicero, Ill. Located on the Illinois ship canal, this plant will receive its stocks from the Cit-Con lube oil plant at Lake Charles, La., by barge, and will become the supply point for the Great Lakes and midwest distribution areas.

This huge project involves 127 Graver tanks—93 shop erected, 34 field erected. All are either cone roof or dished roof type, all-welded steel construction. Four are stainless clad.

Here again is demonstrated the scope of Graver facilities for fabrication and erection of storage and processing tanks. No matter what *your* expansion program involves, call on Graver for your tank and vessel requirements—any quantity...any size and shape...in carbon steel, alloy or special steels, solid stainless or stainless clad.

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REFINING

Wood River Cracking Unit Put on Stream

A NEW fluid catalytic cracking unit recently completed at Wood River Oil & Refining Co.'s Hartford, Ill., refinery, is now on stream after completing test runs, according to Fred C. Koch, president of the company.

The cracker's completion marks the end of another step in the firm's postwar expansion program. Design capacity of the fluid unit is 7,500 bbl. daily of gas oil charging stock.

The daily capacity of Wood River's refinery has been raised to 30,000 bbl. with completion of the unit.

Capacity of the plant in 1940 was 10,000 bbl. a day with conventional thermal cracking equipment. The expansion program was begun at the end of the war to improve product quality and keep up with growing demands, and the first major plant addition was a Cycloversion unit for catalytic desulfurization, catalytic cracking, and reforming. Later vacuum distillation equipment was installed. Completed last year and put on stream was a catalytic polymerization unit.

The fluid catalytic cracking is a Universal Oil Products Co. design. Process and mechanical design of the installation, which includes a gas-concentration system, was by U.O.P. engineers. Detailed designs were made by Koch Engineering Co., Wichita, and the refinery's own organization, under direction of C. D. Read, general manager of refineries, constructed the unit. Embodying the latest features developed by U.O.P., the cracker includes a mixed pressure turbine and a slurry settler.

Graver Tank & Manufacturing Co. supplied vessels for the cracking plant, including the regenerator, reactor, stripper, main and auxiliary catalyst storage hoppers.

New Installations on Full Stream at Lima Refinery

A new combination crude-distillation and delayed-coking unit is now on full stream at the Lima refinery of Standard Oil Co. (Ohio). The 20,000-bbl. unit is the second major new unit to be placed on stream in the $30,000,000 Lima construction program. The first was a fluid catalytic cracking unit started up late last year.

The crude coker, costing $5,500,000, will process Illinois reduced crude and West Texas virgin crudes to produce 26,000 lb. of coke hourly and 4,700 bbl. of gasoline daily. The two coking drums measure 17½ ft. in diameter and 70 ft. in height, and with their drilling rigs installed, tower 220 ft. in height.

Sunray Cat Cracker Runs at 99.93 Per Cent Efficiency

The catalytic cracking unit at Sunray Oil Corp.'s refinery near Duncan, Okla., recently completed its second year of continuous operation without shutdown, and was operated at 99.93 per cent efficiency, the company reported last week.

The cracker put the 3,600,000th barrel of gas oil through on March 7 after a turnaround operation.

F. L. Martin, executive vice president heading the refining division of Sunray, said that the excellent record of the refining units during the past year has proved that the plant has "great flexibility of operation."

He said that no need for turnaround is in sight, and the unit is ready to go into the summer refining months with high productive capacity.

Two Asphalt Plants Are Being Readied by Stancal

Two additional asphalt refineries will be put in operation by Standard Oil Co. of California during the year, the company reported this week.

The first of the plants is now under construction near Seattle, Wash., and the second is currently undergoing conversion to asphalt manufacture near Mobile, Ala.

The new plant near Seattle will process California crude oil, and will consist of a modern vacuum distillation unit, storage tanks, and complete facilities for truck and railroad loading. The refinery follows by 3 years construction of a similar plant near Portland, Ore.

The Mobile conversion is being made at a refinery recently acquired by American Bitumuls Co. from Coastal Petroleum Co. *(The Oil and Gas Journal, February 2, 1950, page 87).* The installations previously manufactured gasoline and fuel oils.

The two plants, when completed, will supplement 11 asphalt-emulsion plants which are located on the East Coast, in the Mid-West, and South, and on the Pacific Coast. The company also markets asphalts produced

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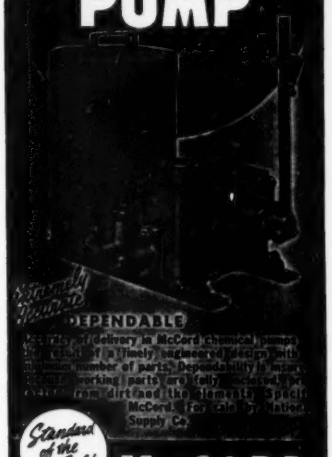
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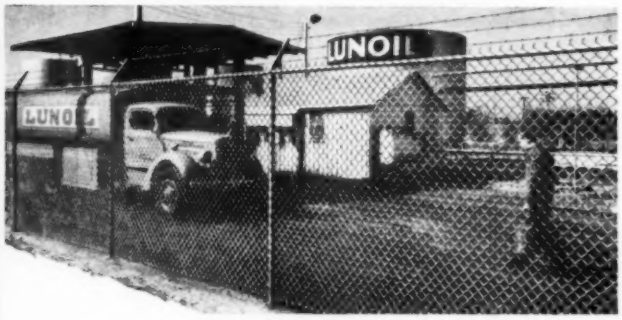

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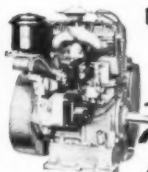

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15 to 30 hp.

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Three types of asphalt are being manufactured: hot asphalts, industrial asphalts, and asphaltic emulsions. Stancal Asphalt & Bitumuls Co. owns American Bitumuls Co. and International Bitumen Emulsion Corp., a foreign operating company, and holds majority interest in Canadian Bitumuls Co., Ltd.

New Lubrication Findings Discussed by Scientists

The relation of viscosity to the molecular structure of lubricants and thin-film lubrication were among topics under discussion recently at a conference held by the New York Academy of Sciences' Section of Physics and Chemistry.

Leading the discussion on viscosity was A. Bondi, Shell Development Co., Emeryville, Calif.; H. Blok, Shell Laboratories, Delft, The Netherlands, discussed thin-film lubrication.

C. B. Davies, Shell Laboratories, Thornton, England, discussed wear as influenced by roughness and oxidation; and R. Brill, Phillips Petroleum Co., Bartlesville, Okla., reported on studies of lubricating surfaces as revealed by X-ray and electron diffraction.

The fine structure of lubricating greases was discussed by B. B. Farrington of California Research Co., Richmond.

Topic of the 2-day discussion was "The Fundamental Aspects of Lubrication."

Lube Production Down in 1949, Mines Bureau Says

Production of lubricants during 1949 totaled 42,389,000 bbl., compared with 51,416,000 bbl. in 1948, the U. S. Bureau of Mines reported last week.

Total demand for lubricants decreased 7.3 per cent from the 1948 total. Total demand during 1949 was 46,013,000 bbl., a decrease of 3,362,000 bbl. from 1948.

The bureau reported domestic demand amounted to 33,008,000 bbl., or a decline of 2,975,000 or 9 per cent from 1948.

Exports totaled 13,005,000 bbl., or a decrease of 387,000 bbl. This represents a decline of 219 per cent over a year ago.

December demand, both domestic and export, totaled 3,990,000 bbl., a decrease of 148,000 bbl., or 3.7 per cent. Exports amounted to 1,343,000 bbl. against 1,192,000 in the 1948 month. Domestic demand in December was 2,647,000 bbl. compared with 2,946,000 the comparable month in 1948.

Stocks on hand at the end of the year amounted to 9,219,000 bbl. This compares with 9,843,000 bbl. on hand at the close of 1948.

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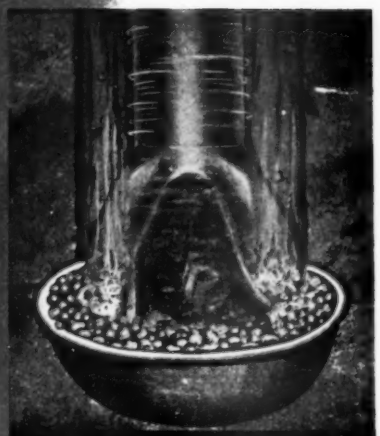
give FASTER PENETRATION

The powerful jetting action cleans the bottom of the hole, allowing the cutters to work on new formation at all times. This results in measurably faster drilling in all formations.

and MORE HOLE PER BIT

Since the cutters are not worn away pulverizing pieces of formation that have already been broken loose, you can depend on Reed *'Liquid-Blast'* Rock Bits for more hole per bit and fewer round trips per well.



Bits without proper bottom hole cleaning action have an action similar to the above illustration.

The new Reed Liquid-Blast Rock Bit is continuously cutting new formations.

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Among the

Drilling Contractors

Todd Elected President Of Kansas Contractors

WICHITA. — New officers of the Kansas chapter of the American Association of Oil Well Drilling Contractors elected at a meeting here March 8 include: C. H. Todd, president of Rine Drilling Co., Wichita, president; E. L. McCartney, B and B Drilling Co., Inc., Wichita, vice president; J. G. Adkins, Adkins Drilling Co., Great Bend, Central Kansas vice chairman; and B. W. Burks, Derby Drilling Co., Wichita, secretary. Todd succeeds Hebner Beardmore, Jr., Beardmore Drilling Co., Wichita.

Drilling Activity Rises With Coming of Spring

Reflecting the approach of the spring season and general improvement in weather conditions which have enabled oil companies and contractors to resume drilling development in various areas where operations have been suspended because of excessive cold and snow or continued rains, high water and inaccessible locations, another increase in the number of rotary rigs running in the United States and western Canada was reported during the week ended March 6 (latest report).

During that week, active rigs totaled 2,042, of which 1,962 were in the United States and 80 in Canada. The total was 32 greater than during the preceding week, and 94 more than the number running a month ago when drilling activity was at its lowest point so far this year. By coincidence, the total number running in the United States was the same as reported during the corresponding week a year ago. Including western Canada, the total was 11 greater than a year ago.

Although a substantial decline in drilling was reported in the Gulf Coast region, this was more than offset by the increase in the number of rigs operating in the West Texas area, the latter being occasioned largely by the expanding development along the Scurry County trend of fields.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 3-6-50	Change week ended 2-27-50	Change week ended 3-7-49
Gulf Coast	475	—26	—139
W. Tex.-N. M.	707	+35	+185
Ark.-N. La.-E. Tex.	147	+ 7	
Oklahoma	248	+ 7	+ 26
Kansas	117	+ 2	+ 30
Illinois-Eastern	70	+13	— 12
Rocky Mountains	64	+ 4	— 34
Pacific Coast	134	— 7	— 56
Total United States	1,962	+35	
Western Canada	80	— 3	+ 11
Total	2,042	+32	+ 11

*Courtesy Hughes Tool Co.

M & M Drilling has contracted to drill a 4,000-ft. test for Superior Oil Co. Test will be the 39 Schwing Lumber & Shingle Co., Bayou Blue field, 74-9s-10e, Iberville Parish, Louisiana.

Danciger Oil & Refining Co., Fort Worth, as contractor, has spudded William Helis 1 State Lease 912, a projected 12,000-ft. wildcat in Plaquemines Parish, Louisiana Gulf Coast.

On the derrick floor of Steelco Drilling Co. rig operating in the new Glenrock field, Converse County, Wyoming, are, left to right: Delaney Willet, driller; Earl Silvers, derrick man; Charles Chapman, driller; Joe Fowler, derrick man; Bully Brent, driller; Charles Wooten, motorman; Tom Popp, floorman; Bud Conner, derrick man; William Caldwell and D. H. Caldwell, motormen.

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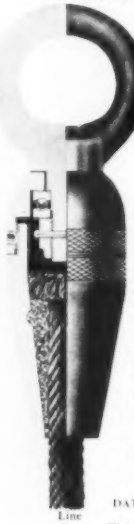

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Designed for use in using wire lines instead of manila rope for cat lines. Wire line is babbitted in socket end for use over the derrick while sufficient length of manila is used in ring end for use with cat head winch. This results in a safer and more economical cat line.

These swivels are all tested to 10,000 lbs. before being shipped.

Ask your Supply Company or write for full information and price list.

	DATA			
	Line Size Up to	Weight Lbs.	Over-All Length, Inches	Breaking Strength, Lbs.
105	1¼"	4⅛	8⅛	40,000
105-A	1¼"	4¼	8⅛	40,000
106	1¼"	5¼	8½	60,000

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Mac Drilling Co. Houston

Growth.—Mac Drilling Co., Houston, was organized in July 1941. It began operations with five steam rigs, two designed to drill to 11,000 ft., and three to 8,000 ft. The company still operates the same rigs; however, much of the original equipment has been replaced and it now has one rig which will drill to 15,000 ft., two designed to drill to 13,500 ft. and two to 9,500 ft.

R. M. McDANNALD

Personnel.—R. M. McDannald is co-owner and managing partner of the firm. He was graduated from the University of Oklahoma with a petroleum engineering degree in 1937, and has been active in the oil industry since then. Other owners of the company include: G. C. McDannald, also a petroleum engineering graduate of the University of Oklahoma; Mrs. E. F. Hall; Mrs. R. H. Stark, Jr.; and Mrs. W. H. LaRue.

Toolpushers are: O. V. Mankins, Fred Schulz, Ben Reese and Elmer McKinney.

Operations.—Currently, only one rig is running. It is under contract to Shell Oil Co. and is drilling in the Hope area of Lavaca County, Texas.

Sidelights.—Under contract to major oil companies, Mac Drilling Co. drilled the discovery wells for the following fields, all in South and East Texas: Mercy, San Jacinto County; East Hillister, Tyler County; Landa, Hidalgo County; Ricardo, Kleberg County; Fred, Tyler County. The company also has its own production in the Evergreen field, San Jacinto County, which it discovered in 1947.

Gene Reid Drilling Co., Bakersfield, Calif., has the contract for a well to be drilled for Enterprise Oil Co. in the Tejon-Reserve area, Kern County, California. The well will be 46-36 R.E.P., with location in 34-11n-19w.

Tex-Mex Drilling Co. has been awarded the contract for deepening Bert Fields 1 Thigpen-Herold, a wildcat located in 23-16n-16w, 7 miles south of Greenwood, in Caddo Parish, Louisiana. The new contract calls for deepening the hole from its present depth of 6,515 ft. to 8,600 ft.

Noble Drilling Co., Tulsa, has contracted to drill two offshore wells for the California Co. in Bay March-and Block 2 field, Lafourche Parish, Louisiana. The F-1 State Lease 1366 has a projected depth of 6,500 ft., and the D-9 State Lease 1367 will be drilled to 4,800 ft.

Carl Short, Inc., is rigging up to drill Pure Oil Co. 1 Industrial Lumber Co., wildcat in 33-3s-5w, Allen Parish, Louisiana Gulf Coast. The venture has a projected depth of 9,000 ft.

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LONG-LIFE DRILL COLLAR COMPOUND

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We were taking a swing through the Middle East, a few weeks ago, when we came upon this smiling Arabian checking over his rig.

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Well, we went through the darnedest gyrations trying to show him how adjustable speed Gýrol Fluid Drives provide smooth starts against a full connected load . . . how any desired rate of acceleration is possible without danger of stalling the engine

We even used sign language when we described how he would have more stable drilling speeds on the rotary, from creeping to maximum, with Gýrol Fluid Drives, and that on the slush pump he could stretch the setup for days and weeks.

Finally, this guy smiles and says in perfect English —"But, gentlemen . . . I know all about Gýrol Fluid Drives! We've used them here for years."

All this, of course, points up the fact that operators are getting good results from Gýrol Fluid Drives. You can protect your investment and benefit, too, by specifying them on the next drilling equipment you buy.

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NATURAL GAS

FPC Approved 2,637 Miles of Gas Line

WASHINGTON.—The Federal Power Commission reported last week that during the last half of 1949 it issued 57 certificates authorizing the construction of 2,637 miles of natural-gas pipe lines at an estimated total cost of $195,587,697.

The new lines will have a total compressor horsepower of 132,025 and a capacity in excess of 1,000,000 M.c.f. daily of natural gas and will increase distribution in 19 states and the District of Columbia.

The 57 certificates brought the total for the full calendar year 1949 to 7,571 miles of pipe line and 499,800 hp. of compressor units, to be constructed at a cost of $615,249,100.

The largest single authorization issued during the last half of the year was for the Tennessee Gas Transmission Co.'s transmission line from Kentucky to Buffalo, N. Y., and additions to its Texas-Kentucky line which involves 1,032 miles of pipe line and 73,000 hp. in addition to compressor units and will cost $76,116,585, and will complete the company's over-all project for which the first certificate was issued in December, 1948, involving 1,703 miles of line and 104,400 hp. in compressor units to cost $138,975,804 and provide a delivery capacity of 340,000 M.c.f. daily.

Details of the certificates issued during the last 6 months of last year for projects costing $700,000 or more are shown in the accompanying table.

PROJECTS APPROVED BY FEDERAL POWER COMMISSION (JULY 1-DECEMBER 30, 1949)

Chicago District Pipe Line Co.—Facilities for liquefaction, storage, and regasification of natural gas near Chicago, including 5,500 hp. compressor station; cost, $6,000,000.

Tennessee Gas Transmission Co.—294 miles 24-in., 26-in., 30-in. loop lines on main line of system, 395 miles 26-in. main transmission line from point on main line in Kentucky to vicinity of Buffalo; 343 miles 6-in. to 16-in. field supply and laterals and additions to compressor facilities totaling 73,000 hp. (Part of facilities remaining of original application filed, construction and operation of other families having been authorized December 8, 1948, and May 3, 1949); cost, $76,116,585.

156 miles 30-in. loop lines on main system, and additions to existing compressor facilities totaling 6,800 hp.; cost, $13,887,895.

6 miles of dual 16-in. line submerged crossings of Mississippi River, Greenville, Miss.; cost, $758,387.

Kansas-Nebraska Natural Gas Co., Inc.—308 miles various length of laterals and loops, and replacement of lines, 2½ in. to 12-in., and additions to compressor facilities totaling 3,725 hp. in Kansas and Nebraska; cost, $2,339,457.

Michigan-Wisconsin Pipeline Co., Michigan Consolidated Gas Co.—Additions to compressor facilities totaling 14,000 hp. on main line from Texas to Michigan; 6,000 hp. in Austin, Mich., storage field, and several small laterals. Order modified November 30, 1948, order to authorize use of 24-in. pipe instead of 26-in. on main line, Kansas to Illinois; cost, $7,078,000.

Iroquois Gas Corp.—15 miles 20-in., 22-in. loop lines, Erie County, New York, and 21 miles 6-8-in. storage connecting lines, Zoar, Collins, Quaker, and Lawtons storage fields, New York; cost, $1,556,000.

Southern Natural Gas Co.—46 miles various loops, 4 to 12-in. on laterals in Alabama and Mississippi; cost, $1,226,070.

Colorado Interstate Gas Co.—38 miles 20-in. loops on western end of Lakin-Denver line, Colorado, and compressor additions in Kansas and Colorado totaling 12,000 hp.; cost, $4,328,930.

Arkansas Louisiana Gas Co.—163 miles 20-in., Wascom gas field, Texas, to Hot Springs County, Arkansas, and 5 miles small laterals; cost, $7,618,500.

Ohio Fuel Gas Co.—60 miles 3 to 12-in. high-pressure storage lines in Weaver, Wellington, and Benton storage pools in Ohio; cost, $1,090,975.

Jersey Central Power & Light Co.—39 miles 10-in., from connection with Texas Eastern Transmission Corp., to facilities in New Jersey; cost, $1,208,260.

United Gas Pipe Line Co.—28 miles 16-in. to connect Mud Lake, East Mud Lake, Holly Beach, and Cameron Meadows gas fields in Louisiana, to system near Port Arthur, Tex.; cost, $1,792,000.

106 miles 20-in. loops on existing 24-in. Carthage-Sterlington, La., line; cost, $5,113,300.

Consolidated Edison Co. of New York, Inc. 23 miles 16-in. to 30-in. line in New York City to connect with system of Transcontinental Gas Pipe Line Corp.; cost, $9,307,000.

Brooklyn Union Gas Co.—12 miles 10-24-in., to connect with Consolidated Edison Co. of New York, Inc.'s, system in New York City; cost, $2,916,000.

East Tennessee Natural Gas Co.—18 miles 16-in. tie-over line from connection on 22-in. line at Oak Ridge, Tenn., to 12¾-in. Chattanooga-Knoxville, Tenn., line; cost, $875,000.

Central Hudson Gas & Electric Corp.—40 miles 10-in., from connection with Home Gas Co., near Tuxedo, N. Y., to manufactured-gas plant in Poughkeepsie, N. Y., and 2 miles 8-in. lateral to Newburgh, N. Y.; cost, $1,700,000.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—3,200 hp. compressor station, 340 miles 12-in. line, Worland field, Wyoming, to facilities of Montana-Dakota in Montana, and by Montana-Dakota, 5 miles 3-in. and 8-in. laterals; facilities to be leased by Montana-Dakota and operated as integral part of its existing system; cost, $9,132,085.

Gas Firms Urge Approval Of Texas-Illinois Line

A number of small Illinois gas companies told the Federal Power Commission in Washington, D. C., last week that they can cut rates sharply if allowed to get natural gas from a proposed new Texas-to-Illinois pipe line.

The firms are intervenors in a hearing on the application of Texas-Illinois Natural Gas Pipe Line Co., Chicago, to construct a 1,300-mile line from Texas to the Joliet, Ill., area. The firm hopes to complete the $117,000,000 project by November of next year. The 30-in. line would have a daily capacity of 305,000,000 cu. ft. of gas.

The intervenors said they use manufactured gas at the present time, which is much more expensive than natural gas, and has a lower heating value.

Texas-Illinois representatives told FPC that the firm is willing to supply gas to the following firms if their line is approved: Union Gas Electric Co., Bloomington; Illinois Power Co., Decatur; and Allied Gas Co., Paxton, all in Illinois; Southeastern Illinois Gas Co., Chicago, and Interstate Power Co., Clinton, Iowa.

Natural Gasoline

Standard of Texas Wants To Dismantle Gas Plant

Standard Oil Co. of Texas has announced that it intends to dismantle its 23,500 gal. per day natural gasoline plant in the South Ward field of Ward County, Texas. The Texas Railroad Commission has scheduled a hearing on the proposal in Austin March 28.

The commission called the hearing after the company announced it would dismantle the plant due to the fact that its operation has reached an economic limit beyond which it cannot be operated at a profit.

New Firm Formed: Buys L.P.G. Storage Facilities

D. E. Buchanan, president, Hiwan Oil & Gas Co., Magnolia, Ark., has announced formation of an affiliated company, the Hiwan Petroleum Co., which has purchased the pressure tankage and storage facilities at Cotton Valley, La., constructed as an adjunct to the 100-octane refinery built by Reconstruction Finance Corp. and operated as a war plant by Premier Refining Co. Hiwan Oil & Gas Co. operates a natural-gasoline plant in the Atlanta field near Magnolia.

Purchase price was not announced, but it is estimated that approximately $400,000 went into the construction of facilities purchased by Hiwan Petroleum. Pressure tankage for butane, propane, and L.P.G. mixtures of approximately 2,000,000 gal., with tank-car and truck-loading, unloading, and blending facilities, is involved, Buchanan announced. He said that very little expenditure will be required to equip the plant for all-year operation as a complete liquefied petroleum gas terminal.

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PIPE LINES

Transcontinental to Let South Section Contracts

Preparations are being made for letting of contracts for Transcontinental Pipe Line Co.'s southern section of its Texas-New York City project, in the Eunice, La.-Mercedes, Tex., area. Specifications have been issued by Fish Constructors, Inc., to contractors, and it is expected that contracts will be let during the latter part of March. It appears unlikely that construction of this section will start before June.

Pipe laying is now being carried on for Transcontinental under Fish direction by several contractors, including Williams Brothers Corp. east of Athens, Ga.; R. H. Fulton & Co., north of Spartanburg, S. C.; Smith Contracting Corp., in Virginia, and Oklahoma Contracting Corp., near Edgewater, N. J. Work of Wunderlich & Griffis in Maryland has not started.

Omaha Bridge & Dock Co. has finished the Passaic River crossing and is now working on the Hackensack River crossing in New Jersey.

A bridge has been finished across the Coosa River in Alabama. The Atchafalaya River in Louisiana will be crossed by a bridge contracted by Kansas City Bridge Co., which will not be completed until February 1951. Pending construction of the bridge, a temporary line is to be used across the Atchafalaya River. The Hudson River crossing will be started in May.

Five compressor stations have been completed for Transcontinental: No. 6, at St. Francisville, La., near the Mississippi River; No. 9, near Linden, Ala.; No. 12, near Atlanta, Ga.; No. 15, near Mooresville, N. C.; and No. 18, near Orange, Va. Construction will start soon for Station No. 3 in the Wharton, Tex., area and No. 4 near Kountze, Tex.

The Fish organization is now engaged in purging the completed 600-mile, 30-in. section extending northeast from Eunice, La. After purging, the line is to be filled with natural gas from Interstate Natural Gas Co. and Southern Natural Gas Co. systems which has been contracted for the purpose of preparing this section for transmission operations immediately following completion scheduled for October 1, 1950.

Interprovincial Making Plans for 1951 Projects

CALGARY. — Interprovincial Pipe Line Co., which will build a 1,180-mile oil pipe line this year from Redwater through Edmonton to Superior, Wis., is already contemplating expansion plans for 1951 and thereafter.

The initial line will have six pump stations and a maximum throughput of 95,000 bbl. daily. Now being talked of are six additional pump stations

TIE-IN WELD.—A utility welder is shown making a tie-in weld during the laying of 30-in. pipe in Alabama for Transcontinental Gas Pipe Line Corp.'s Texas-to-New York gas line.

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PIPE LINE CONSTRUCTION EQUIPMENT and SERVICE SINCE 1933

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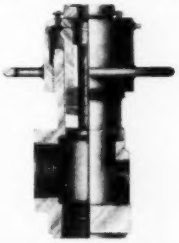

The NORRIS "T" Type box eliminates use of a Tee fitting to connect on to lead line. "Pull-through" Type allows all internal parts to pull out through the box with the Polished Rod.

For information on other NORRIS Stuffing Boxes, write for Bulletin No. 32.

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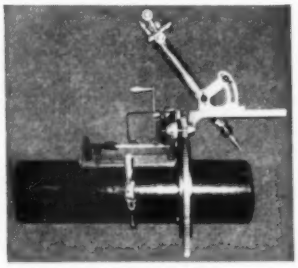

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to boost capacity throughput to between 130,000 and 135,000 bbl. daily. Further boosts by line looping or building a second line are later prospects.

The Interprovincial line will serve markets outside Alberta. Alberta refineries will continue to be served with 25,000 bbl. daily now and up to 40,000 bbl. by mid-1951, through existing pipe lines and other transport means, and through the Interprovincial link to Edmonton.

Tennessee Gas Transmission Plans Additional Expansion

Tennessee Gas Transmission Co. is planning this year the greatest expansion program in any single year in its history, Gardiner Symonds, president, said last week.

At the start of 1950, daily capacity of its far-flung system was 710,000,000 cu. ft. of natural gas, which represents an increase of approximately 100,000,000 cu. ft. during the past year.

Speaking before the eastern Pennsylvania group of the Investment Bankers Association, Symonds said that Tennessee Gas Transmission's plans this year will carry its daily capacity close to 1,060,000,000 cu. ft., as authorized by the Federal Power Commission.

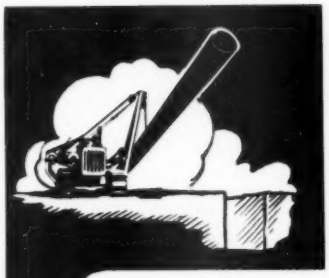
Shortly the firm will start construction on a 395-mile extension of its main transmission system from northern Kentucky across Ohio and Pennsylvania to the vicinity of Buffalo, together with a lateral line to near Pittsburgh. The company also plans to lay 612 miles of parallel main line along its existing system this year, and a 200-mile lateral gathering line in Louisiana.

As an example of how more and more people soon will be receiving natural gas from Texas fields, Symonds estimated that Pennsylvania alone by 1952 will be using 360,000,000,000 cu. ft. annually from Texas and the Appalachian area, compared with 290,000,000,000 last year, despite the depletion of natural-gas reserves in the Appalachian area itself.

Hearings Under Way on New England Gas-Line Proposals

Hearings opened March 7 in Washington, D. C., before Federal Power Commission, on application of nine companies involving natural-gas service to New England, northeastern Ohio, and in New York State. All proposals previously were consolidated by FPC into a single hearing, due to the fact all applicants, directly or indirectly, would get natural gas from the same source—fields in Texas.

Two of the New England applications are competitive, as are three of the Ohio proposals. Most of the



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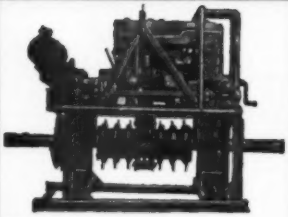

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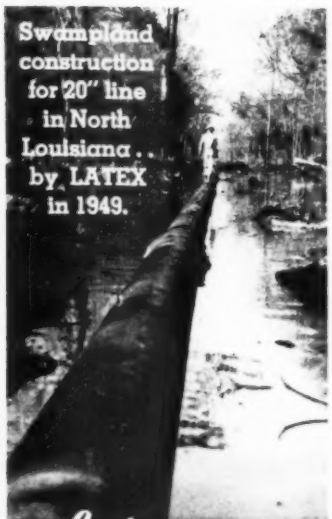

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cases are tied to a petition of Tennessee Gas Transmission Co. to expand capacity of its natural-gas pipeline system by 250,000,000 cu. ft. daily, which would bring the daily total capacity to 1,310,000,000 cu. ft. The project would make more natural-gas available to Ohio, New York, and New England, as well as provide greater supplies to present customers.

Proposal is for a 303-mile mainline extension from the eastern terminus at Buffalo of its authorized Kentucky to Buffalo line *(see news item in the pipe-line section of this issue regarding Tennessee Gas Transmission expansion plans)*, to a point on the New York-Massachusetts state line. The program also involves construction of approximately 786 miles of loop along T.G.T.'s existing or authorized line between Texas and Buffalo.

Texas Gas Orders Microwave Equipment

Texas Gas Transmission Corp. has awarded contract to Motorola, Inc., for a pilot installation of microwave communications equipment, L. E. Ingham, vice president in charge of operations, announced last week. If the pilot installation proves satisfactory, the firm may eventually adopt microwave communication for its entire pipe-line system.

Consisting of two terminal stations and one repeater station, the microwave system will utilize a frequency with a wave length only $1^3/_4$ in. long. Using parabolic and flat reflectors and three 150-ft. towers, the equipment will transmit narrow beams of these high-frequency radio waves between the stations. In this way, the installation can perform the function of telephone lines using 1,500 poles and 250 miles of wire.

A 50-mile section, to be installed in March, will provide Texas Gas Transmission with five communication channels between its gas dispatching office and the compressor station at Guthrie, La., and its compressor station at Sharon, La.

H. L. Stowers, chief engineer, and Fred Stull, superintendent of communication and corrosion engineering, said that the channels will be used in the following ways: two will be used for dispatching and interstation conversations; one will form a link in the company's telephone line; and one will be held in reserve. The remaining channel will be used for telemetering; that is, the automatic sending of instrument readings. Up to 10 readings—for pressure, temperature, and rate of flow—can be transmitted to either terminal station on this single channel.

A microwave communication system is regarded as less expensive initially and more reliable, requiring less maintenance than company-owned pole lines.

Bethlehem Prepares for Venezuela Water Line

In the Ciudad Bolivar area near the Orinoco River in Venezuela, Bethlehem Steel Co. interests will start construction during the last half of March for a 30-mile, 8-in., bare water line. This will be laid near the tracks of the steel company's recently completed railroad to serve iron-ore mining operations.

Operations of the contractor, Williams Brothers Co., will be directed by Marvin Jones, general superintendent with headquarters at Las Piedras on the Paraguana Peninsula in Western Venezuela.

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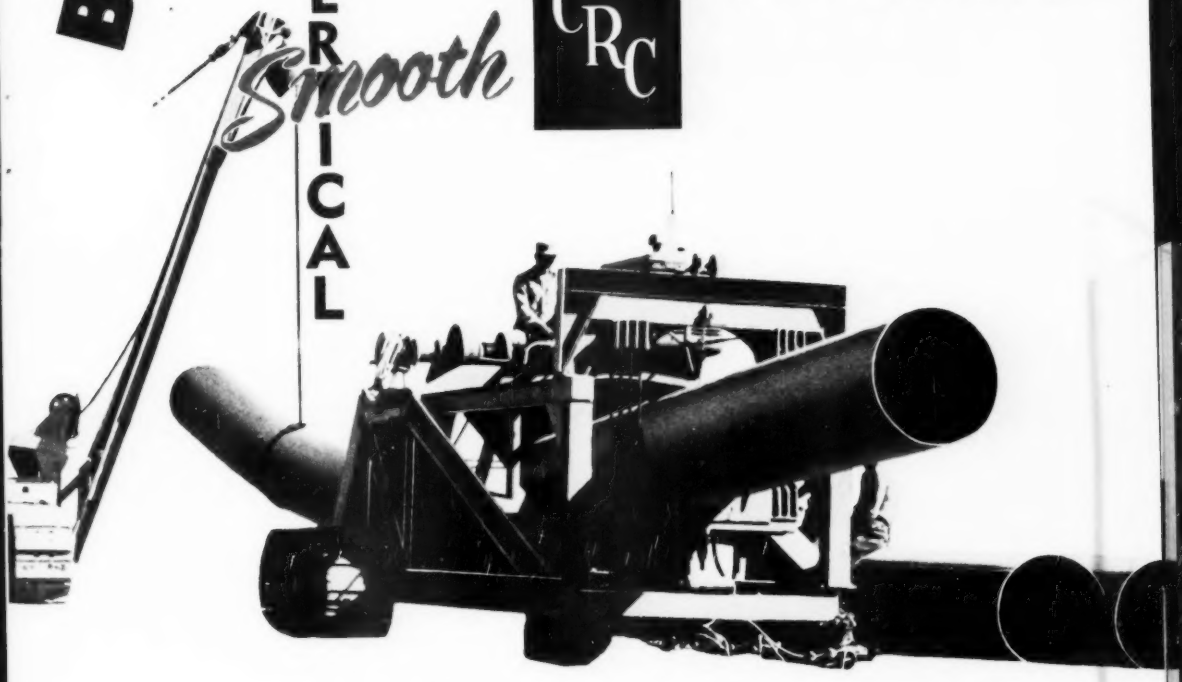

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Less right-of-way is required for the bending since the pipe is placed inside the frame in a vertical position. The pipe may be put into the machine from either end.

Because the pipe is bent in a vertical plane the degree of bend may be easily measured with a level or bubble-type protractor . . . simply determine the level reading of each end of the pipe, add, and the result is the degree of bend. There's no guesswork; your bend will accurately fit the ditch.

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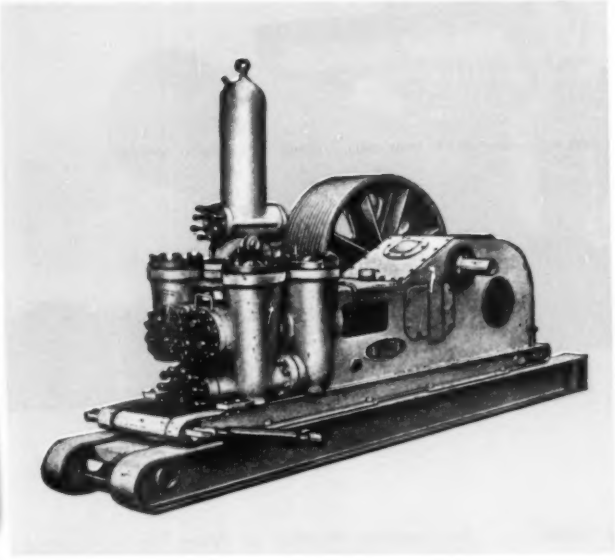

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Oklahoma Test Interests Geologists

A PROMISING oil test on a structure that almost literally hangs on the steep north dip of the Wichita Mountains in Washita County, Oklahoma, is attracting attention among geologists. Carter Oil Co. 1 Galloway, NE NE NW 22-8n-18w, a drill-stem test in Hoxbar granite wash at 5,305-55 ft., open 2 hours, had gas in 50 minutes, and recovered 780 ft. of 28.2°-gravity oil and 30 ft. of oil-cut mud.

This test is almost certainly located south of the axis of the Anadarko basin and up on the steep-dipping north flank of the Wichita Mountains. The axis and deepest part of the Anadarko basin lies close to the mountain front, and from the axis it rises slowly to the north, dying out across the Kansas line in some parts at least.

The Galloway well was drilled on a seismograph structure, and is located a little northwest of a well which found gas and some distillate in a sand in the Springer in 1946. This discovery was called Rocky gas field. The Galloway test is on a location which it was thought would catch the Rocky gas sand farther downdip, where it might contain oil. From an elevation of 1,663 ft. (D.F.), it caught the top of the Springer at 5,917 ft., and was drilled to a total depth of 7,616 ft., before being plugged back to test the granite wash.

The datum on top of the Springer is actually higher than in the Rocky field test, but the unconformity between the granite wash and the top of the Springer is such that this does not mean much. The well could still be, and the geologists are inclined to believe actually is, downdip in the Springer from the Rocky well.

After reaching top of the Springer, the Galloway test was drilled about 1,700 ft. into that formation. No cores were taken in the Springer until the first sandy phase was found in the shale section. When the core was examined, it was found to show dips of 85°; in other words the formation was standing almost straight up and down. Drilling was continued in shale, and more cores were taken below the sand. These cores continued to show steel dips, the lowest being 65°, and after a few false shows of flattening of dip, it was concluded there was little hope.

Best estimate of the geologists is that the 1,700 ft. drilled in the Springer was the equivalent of not more than 300 to 400 ft. vertical progress if drilled through a flat formation. The sand that produced gas and distillate in the Rocky well was never found, although seismic data and other factors make the geologists believe the Galloway well is at least 200 ft. downdip on that part of the Springer, and that if present at the Galloway location, it would have been drilled through.

Obviously in a structural fold along a steep mountain side, a lot of complicated things can happen and in this case undoubtedly did. The Rocky field well showed pretty steep dips in the Springer, but these ranged from 20° to probably as high as 65°. Thus the maximum dip in the Rocky well became the minimum found in the Galloway.

Some very large faulting or overturned folds probably exist somewhere in this vicinity. Not too far away, two wells were drilled, one in 6-7n-17w, and one in 31-8n-17w. One of these drilled a fairly regular succession of formations. The other went into Viola, through some normal section, and then back into Viola again.

All of these items are interesting to geologists as a study in the complex factors involves along mountain fronts. In cases like this, when the drilling bit is cutting almost straight along the bedding plane of a formation, the geologist wishes there was some safe, easy, cheap way to turn the bit almost 90°. Then the driller would have the paradox of drilling horizontally and apparently making no hole vertically, while the geologist would be assuring him that geologically he was cutting hole in older and normally deeper rocks.

Another question is where the oil in the granite wash is coming from. What is its source, how did it get into the wash? In the Galloway, the oil found in the drill-stem test is in a zone some 2,500 ft. below the top of the wash, and around 600 ft. above the bottom of the wash.

Charles J. Deegan

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN AREA.—Carter Oil Co. and Stanolind Oil & Gas Co. have announced location for their Blue Bell Unit wildcat, Duchesne County, Utah, west of their Roosevelt Tertiary discovery. At Glenrock, Wyoming, Steelco Drilling Co. is plugging back to Wall Creek sands for tests of extensions in this field. Ohio Oil Co. has completed its second gas well in the Huntsman area, Nebraska.

SOUTHWEST TEXAS.—The Superior Oil Co. has opened a new oil field with completion of the 1 Minnie S. Welder, 5 miles northeast of Sinton, San Patricio County. The well flowed 507 bbl. of 39.1°-gravity oil daily through a 14/64-in. choke, with 1,350 psi. pressure on the tubing. Hole is bottomed at 8,822 ft., and production is through perforations at 8,122-32 ft.

WEST TEXAS.—An unofficial new "high" for the reef in Kent and Scurry counties was reported this week at Caroline Hunt 1 J. W. Young, 166-G-W&NW, 7½ miles northwest of the town of Clairemont. If the limestone topped at 6,204 ft. proves to be the reef, its minus datum point is 4,116 ft. Further reports said oil-saturated lime was cored at 6,228-37 ft. Republic Natural Gas 1 American Republics, south outpost to Pegasus field, in NW NW 6-40-T5S-T&P, recovered 17 stands of drilling fluid, plus 1,440 ft. of free on a drill-stem test in the Ellenburger from 13,025-13,160 ft. The tool was open 90 minutes. Bottom-hole flowing pressure ranged from 1,010-1,400 psi. It was to acidize.

OKLAHOMA

Carter Prepares to Test Washita County Wildcat

WITH prospects of making a good producer, Carter Oil Co. has run casing and is preparing to test oil and gas showings encountered in Granite Wash at its 1 Lee Galloway, NE NE NW 22-8n-12w, a wildcat located 2 miles west of Rocky, southern Washita County, in the Anadarko basin. The 7-in. string was landed at 5,422 ft., through the section to be tested, after hole had been carried to a total depth of 7,616 ft. without important additional showings in the lower zones.

Showings were encountered all through the Granite Wash, the most promising of which were in an interval at 5,305-55 ft., where a drill-stem test resulted in a recovery of 780 ft. of clean oil plus 30 ft. of oil and gas-cut mud. First reported test was at 4,603-63 ft., where a good gas blow resulted. Another test at 4,830-77 ft. gave a recovery of 120 ft. of slightly oil and gas-cut mud. In a later test of an interval at 5,410-39 ft., the well flowed gas at the rate of 250,000 cu. ft. of gas daily and yielded 3 ft. of free oil and 30 ft. of oil and gas-cut mud when tester was pulled.

The well is about 1¾ miles northwest of a lone gas well completed sometime ago by Atlantic Refining Co., and is about 20 miles southeast of the prolific Elk City field which extends from Beckham County into western Washita County.

In the meantime, Stanolind Oil & Gas Co. has suspended operations for the time being at its 1 School Land, another interesting Washita County wildcat, located in the NE SW SW 36-9n-17w, about 8 miles northeast of the Carter well. Stanolind's wildcat, drilled to a total depth of 13,505 ft. and plugged back to 7,690 ft., has been testing a series of intervals above the latter depth. The tests, the latest of which took in an interval at 6,724-35 ft., resulted in several fairly good gas blows but none gave indication of commercial importance.

The Anadarko basin is getting another interesting wildcat with Barnsdall Oil Co. making location for a projected 14,000-ft. test in Ellis County, on the extreme western edge of the state. The test, 1 Hanan, is located about 3½ miles northeast of Arnett in the C SE NW 1-19n-24w, on a farmout lease in a large block held by Continental Oil Co. Magnolia Petroleum Co. and Mid-Continent Petroleum Co. also have substantial acreage adjoining the Continental block.

In the recently revived Frederick pool, in Tillman County, in the extreme southern part of the state, S. D. Johnson and associates appear to have a second good Canyon lime producer in their 2 Kunc, NE SW SW 34-2s-17w, which flowed, after acidizing, at the rate of 15 bbl. of oil per hour through 2-in. tubing with casing perforated in the pay at 3,022-38 ft. The well is a location south of 1 Kunc, which revived the pool with its recent completion from the same pay flowing 190 bbl. of clean oil daily through 10/64-in. choke. Since completion of the latter well, Kerr-McGee Oil Industries, Inc., has gone back into its original discovery well, 1 Hinson, NE SE SE 33-2s-17w, which has been pumping 12 bbl. of oil and 2 bbl. of water daily from slightly shallower zones, and will attempt to recomplete in the Kunc pay zone. This well is a west offset to Johnson and associates 2 Kunc and southwest of 1 Kunc. Also, Cities Service Oil Co. is nearing the pay zone in its 1 Kunc, SW NE SW 34-2s-17w, east offset to Johnson and associates 1 Kunc. Three additional locations have been made the past week.

In Payne County, central Oklahoma, Woods Drilling Co. appears to have found a new Wilcox sand pool in the area between the North March and West Norfolk pools, which produce from the Peru sand. Its 1 Hinson, C W½ W½ SW 5-18n-5e, a half-mile east of the former pool and the same distance west of the latter, topped the first Wilcox at 3,673 ft. and the second Wilcox at 3,693 ft. A drill-stem test of an interval at 3,663-75 ft. showed gas in 13 minutes and recovered 100 ft. of clean 43° oil and 105 ft. of muddy oil. No water was indicated. Hole was carried to 3,710 ft. and 7-in. oil string has been run to 3,705 ft.

About 3½ miles west of Davis, Garvin County, and about 3 miles southeast of the south end of the Northwest Hoover pool, W. E. Steelman is opening a new Deese sand pool at his 1 Baldwin, SE NE NE 34-1n-1e. The well, with casing on top the pay at 2,490 ft. and bottom at 2,542 ft., swabbed 48 bbl. of 34° oil in a 17-hour test while cleaning out.

OKLAHOMA SUCCESSFUL WILDCATS

Cotton County: Extension to W. Rabbit Creek—Ross 1 Fink, SW NW NE 16-5s-12w, pumped 85 bbl. of 40°-gravity oil per day from Thomas sand at 1,742-51 ft., TD.

Creek County: New pay in E. Mannford—Weaver & Henry 1 Purcell, NW SE NE 22-19n-9e, pumped 35 bbl. of 38°-gravity oil per day from Oswego at 1,662-74 ft., TD 2,697 ft.

Jefferson County: Sun 1 Samuels, SW NW NW 20-6s-5w, pumped 88 bbl. of 36°-gravity oil per day from lime at 1,870-81 ft., TD 1,905 ft.

Sun 1 Seay, NE SE SE 22-6s-5w, pumped 70 bbl. of 36°-gravity oil per day from sand at 2,518-30 ft., TD 2,642 ft.

Kiowa County: Hudspeth et al 1 Annis, SW SE SW 26-7n-20w, pumped 10 bbl. of 35°-gravity oil per day from quartsite comglomerate at 983-85 ft., TD.

Lincoln County: Bay Petroleum 1 Brezney, SW NW NE 28-12n-6e, pumped 5 bbl. of oil per day from Hunton at 4,405-20 ft., TD 4,776 ft.

Gas discovery in E. Warwick—Slagter & Mayo 1 Sukowaty, NE NE NW 14-14n-3e, flowed 1,250,000 cu. ft. of gas from Prue at 3,976-86 ft., TD 4,223 ft.

Logan County: W. Edmond area—Briscoe et al 1 Brouchoud, C SE NW 28-15n-4w, flowed 75 bbl. of distillate from Bartlesville at 6,379-97 ft., TD 6,436 ft.

McClain County: New pay in SW Goldsby—Danciger 1 Mayer, C SW SE 35-8n-3w, flowed 372 bbl. of 38.3°-gravity oil per day from Joins sand at 10,180-83 ft., TD 10,260 ft.

Payne County: Extension to SW Yale—Blackwell 1 Hoke, NW SW SE 23-19n-5e, flowed 100 bbl. of oil per day from Peru at 2,841-42 ft., TD 2,845 ft.

Pontotoc County: New pay in N. Steedman dist.—G. Martin 1 Hale, NE SW NW 3-4-n-7e, pumped 2 bbl. of 31°-gravity oil per day from sand at 1,114-38 ft., TD.

OKLAHOMA WILDCAT FAILURES

Comanche County: Oil Hunters, Inc. 1 Doyle, NE SE SW 26-1n-11w, dry, TD 2,216 ft., Arbuckle 1,400 ft.

Bilbrey & Albritton 2 Fulbright "B," NE NW SW 33-4n-11w, dry, TD 1,200 ft.

Cummings 1 Cunningham, SE SE SE 25-4n-12w, dry, TD 384 ft., lime 346 ft.

Cotton County: Ross 1 Wright, SW SW NW 22-4s-10w, dry, TD 1,644 ft., conglomerate 890 ft., sand 1,404 ft. and 1,444 ft., Megargel 1,622 ft.

Garvin County: Norman Smith 1 Landrum, SW NW SW 33-4n-1e, dry, TD 4,505 ft., Checkerboard 3,728 ft., base Pennsylvanian 4,100 ft., bromide dense 4,218 ft., first bromide sand 4,304 ft., second bromide sand 4,445 ft.

SE Erin Springs area—Halliburton 1 Lester, NE SE NE 36-4n-4w, dry, TD 8,458 ft., Hogshooter 6,990 ft., second Checkerboard 7,300 ft., first Deese 7,392 ft., Gibson 7,791 ft., fourth Deese 7,986 ft., fifth Deese 8,100 ft., Springer 8,438 ft.

Jackson County: Martgen 1 Elliott, SE SE NW 5-1n-20w, dry, TD 1,625 ft.

Jefferson County: Texas 1 Worrell, NE NW NE 10-6s-7w, dry, TD 4,203 ft., Arbuckle 4,190 ft.

Farris 1 Holland, NE NE SW 15-6s-8w, dry, TD 2,022 ft.

Kay County: Barry et al 1 Hasse, SW SW SW 33-29n-3e, dry, TD 3,410 ft., Pawhuska 1,290 ft., Elgin 1,504 ft., Oread 1,767 ft., Tonkawa 2,263 ft., Hogshooter 2,496 ft., Layton 2,512 ft., Checkerboard 2,808 ft., Big lime-Oswego 2,920 ft., Prue 3,078 ft., Verdigris 3,135 ft., Red Fork 3,268 ft., Mississippi chat 3,360 ft., Mississippi lime 3,390 ft.

Lincoln County: Falcon-Seaboard 1 Christy, SE NE SE 19-14n-3e, dry, TD 5,310 ft., Checkerboard 3,591 ft., conglomerate 3,626 ft., Oswego 4,232 ft., Prue 4,290 ft., Verdigris 4,360 ft., lime 4,536 ft., Red Fork 4,564 ft., Inola 4,647 ft., lime 4,748 ft., Mississippi lime 4,816 ft., Woodford 4,912 ft., Hunton 4,984 ft., Sylvan 5,036 ft., Viola 5,137 ft., dense 5,183 ft., dolomite 5,202 ft., Wilcox 5,235 ft., second Wilcox 5,294 ft.

Kemp et al 1 Harmon, NW SW SW 3-16n-5e, dry, TD 3,668 ft.

Osage County: Mid-Continent 1 Osage, SW SW SE 21-25n-10e, dry, TD 2,099 ft.

Pontotoc County: W. Oakman dist.—Cox 1 Baird, NE NE SW 2-4n-6e, dry, TD 1,871 ft.

Seminole County: E. Tyrola area—Thompson Bros. 1 Boren, NE SE NE 11-5n-6e, dry, TD 2,453 ft., Senora lime 1,860 ft., Senora sand 1,880 ft., Boggy 2,130 ft., unconformity sand 2,306 ft., lower Cromwell 2,320 ft., Pennsylvanian Caney 2,368 ft.

SOUTH LOUISIANA

Magnolia Completing New Gas-Condensate Wildcat

NEW ORLEANS.—Magnolia Petroleum Co. is completing another offshore gas-condensate discovery at the A-1 State Lease 1120, off Cameron Parish. The well was drilled to a depth of 10,940 ft. in side-tracked hole, and operators set 7-in. pipe at 10,925 ft. Through perforations at 10,814-16 ft., the well flowed 32 bbl. of distillate daily plus 3,369,000 cu. ft. of gas, with a flowing pressure on the tubing of 3,550 psi. and a shut-in pressure of 4,050 psi. These perforations were squeezed and operators are testing perforations at 10,806-14 ft.

Meanwhile, off St. Mary Parish, in the Eugene Island area, Pure Oil Co. has drilled to 7,818 ft. in the A-2 State Lease 833, directional test in this area. Operators took 17 cores at interval between 7,621-818 ft., several of which has good shows of oil. Electric log was run at 7,525 ft., which also indicated oil. The well is being drilled due south, and is to bottom approximately 13,228 ft. south of Pure's A-1 State Lease 33 well.

New pay has been discovered in the Big Island area of Rapides Parish from 5,350-56 ft. by Union Producing Co. and M. H. Marr, in 2-4n-3e. The well, 2 Turregano, is bottomed at 5,750 ft. and is reported producing 181 bbl. of oil daily through 11/64-in. choke through 12 perforations at 5,350-52 ft. Flowing pressure on the tubing is 640 psi. and casing pressure is 800 psi.

Gas production has been confirmed in the Lake Sand area of Iberia Parish with completion of the Humble Oil & Refining Co. 1 State Lease 1703. Through perforations at 10,177-82 ft., the well was gaged for 3,079,000 cu. ft. of gas daily plus 53 bbl. of 48°-gravity distillate through ¼-in. choke. Hole is bottomed at 11,930 ft. and has 7-in. casing cemented at 11,721 ft.

The 29 new locations include 3 wildcat starts, 1 in Allen Parish and 2 in Plaquemines Parish. There was one successful exploratory test completed in Rapides Parish, while none were reported dry.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Rapides Parish: New pay at Big Island—Union Producing Co. and M. H. Marr 2 Turregano, 2-4n-3e, top pay (new sand) 5,350 ft., perf. 5,30-52 ft., TD 5,750 ft., IP: 181 bbl. oil per day, 11/64-in. choke, GOR 780, TP 640 psi., CP 800 psi., gravity unknown.

N. CENTRAL TEXAS

Testing Continues on Weiner's Caddo Venture

WICHITA FALLS.—Ted Weiner 1 Olin Calvin, R. Grooms Survey, A-155, Mississippian wildcat 2 miles south of Anarene and northeast of a Caddo producing area reported Caddo limestone with oil odor from 4,646-76 ft. A drill-stem test of the section recovered 210 ft. of mud in 1 hour. No shows were reported in the recovery.

Operators placed top of the Mississippian at 5,202 ft., on elevation of 1,152 ft., and drilled lime with light oil show from 5,202-26 ft. A drill-stem test of that interval had gas in 4 minutes and flowing oil in 75 minutes. It was not allowed to flow. Recovery in the pipe was 3,000 ft. of oil. Flowing pressure on the test was 1,000 psi., and shut-in pressure was 2,500 psi. in 15 minutes. Operators were running electrical surveys before making production tests.

In Cooke County, Sohio Oil Co. 1 Frensley, Robert Finley Survey, A-389, completed dry at 6,500 ft. in the Strawn. It was originally reported as an Ellenburger test, to 6,600 ft. First drill-stem test of the Strawn from 6,150-72 ft., open 75 minutes, had no recovery. Location is 1 mile southeast of Coesfield.

Far West Oil Co. 1 I. G. "Cap" Yates, G. W. Jackson Survey, A-1,120, $2^1/_2$ miles northeast of new conglomerate production in Jack County, was drilling below 4,831 ft. in shale and sandy lime. First core of the Strawn from 3,708-23 ft., recovered 1 ft. of hard sand with odor, 1 ft. of shaly sand with odor, and 13 ft. of shale. Second core from 3,734-49 ft. recovered 7 ft. of sand. Third core, from 4,318-24 ft. recovered sandy conglomerate with odor.

Seven miles southeast of Bryson, and 1 mile south of the Mathis field, Strawn and Marble Falls area, Wm. Hamm, Jr. 1 J. B. Robertson, M. J. Swan Survey, A-1,650, perforated with 120 shots from 4,745-65 ft., swabbed oil and water, and prepared to test. Amount of fluid recovered was not made known.

F. Kirk Johnson et al 1 Hattie Mae Wright, J. W. Bates Survey, A-47, Jack County wildcat $^1/_2$ mile south of Joplin and about 1 mile southeast of a new conglomerate field, completed as a gas well from perforations in the conglomerate from 4,674-4,705 ft. Initial potential was 7,500,000 cu. ft. of gas, flowing under pressure of 800 psi. on tubing and 1,275 psi. on casing.

Russell Maguire 1 N. E. Davis, W. C. RR Survey, A-904, Caddo wildcat 9 miles southeast of Jacksboro and 2 miles of conglomerate production, was shut down in shale at 5,000 ft. Conglomerate was drilled from 4,644-94 ft., and a drill-stem test of the interval recovered 600 ft. of slightly gas-cut mud in 1 hour.

In Throckmorton County, 4 miles northwest of Throckmorton and 1 mile north of the Manning-Harrington field which produces from the Strawn, Dollie Adams 1 J. W. Tharp, BBB&C Survey, completed for 218 bbl. of 44°-gravity oil a day, flowing through 16 64-in. choke on tubing, from perforations in the Caddo at 4,532-44 ft. Pressures were 530 psi. on casing and 275 psi. on tubing. Gas-oil ratio was 671 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Clay County: Bridwell Oil Co. 1 Carle Sanzenbacher, Blk. 9, Grayson CSL, A-156, $2^1/_2$ mi. N Blue Grove, TD 6,058 ft., Caddo conglomerate pay 6,038 ft., casing set to 6,038 ft., flowed 79 bbl. of 43°-gravity oil a day, 3/16-in. choke, GOR 410 cu. ft., CP 600 psi., TP 175 psi.

Stephens County: F. J. Robbins 1 Robert Jackson, 77-4-T&P, 5 mi. E Frankel, TD 1,767 ft., elev. 106 ft., pay 1,765 ft., pumped 3 bbl. of 38°-gravity oil a day.

Stevens-Stephens Co., Inc. 1 Henry Compton, Sec. 30, OAL Sur., 15 mi. SW Breckenridge, TD 3,560 ft., elev. 1,270 ft., Caddo 3,459 ft., pay 3,465 ft., pumped 4 bbl. of 39°-gravity oil a day.

Wise County: Leland Fikes and Standard-Fryer Drilling Co. 1 Conley "A," M. Swift Sur., A-739, 4 mi. SE Chico, TD 5,850 ft., elev. 840 ft., conglomerate 5,461 ft., perf. 160 shots 5,672-88 ft., flowed 187 bbl. of 44°-gravity oil a day, $^1/_4$-in. choke, GOR 195 cu. ft., TP 90 psi.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Consolidated Oil Co. et al 1 Virgil Seay "C," Blk. 110, John W. Harris Subd., $4^1/_2$ mi. W Archer City, dry, TD 4,264 ft.

Fred R. Harrell 1 John M. Fish, Jose Ostaine Sur., A-333, 2 mi. NW Archer City, dry, TD 1,128 ft.

Callanhan County: Ungren & Frazier 1 Elma Jackson, Sec. 17, ETRR Sur., 7 mi. N Baird, dry, TD 1,245 ft.

Comanche County: F. R. Hanrahan 1 E. E. Moore, Sec. 1, ETRR Sur., 3 mi. SE Rising Star, dry, TD 752 ft.

Jack County: Akin & Dimock 1 H. C. Moore "D," Wm. Scott Sur., A-599, $6^1/_2$ mi. SE Bryson, dry, TD 2,031 ft., Palo Pinto 889 ft.

C. Dealy 1 W. B. Munson Estate, Sec. 3, BS&F Sur., A-82, 17 mi. SW Jackboro, dry, TD 5,578 ft., elev. 1,374 ft., Ellenburger 5,381 ft.

L. H. Simpson 1 W. J. Moore, W. Williams Sur., A-876, 4 mi. SE Jacksboro, dry, TD 5,695 ft., elev. 1,170 ft.

Jones County: Clark-Cowden Drilling Corp. 1 J. H. Sauls Est., Sec. 135, BBB&C Sur., 6 mi. NE Hamlin, dry, TD 3,370 ft.

S. C. Herring Drilling Co. 1 E. M. Bostick, Sec. 117, BBB&C Sur., 6 mi. NE Hamlin, dry, TD 3,175 ft.

Lester & Duffield, Inc. 1 D. E. Reeves, J. M. Polk Sur., 2 mi. N Nugent, dry, TD 2,201 ft., Dotham 1,586 ft.

W. F. Nenney 1 A. W. Adams, Sec. 18, D&DA, 6 mi. NE Anson, dry, TD 4,767 ft., elev. 1,626 ft., Valera 1,000 ft., Noodle Creek 1,892 ft., Flippen 2,192 ft., Home Creek 2,724 ft.

Ungren & Frazier 1 Wright & Stewart, S. Andrews Sur. 191, 4 mi. SE Hawley, dry, TD 2,242 ft., elev. 1,609 ft.

Knox County: Akin & Dimock 1 C. G. Yost, 71-2-D&W Sur., $3^1/_2$ mi. NW Munday, dry, TD 2,055 ft.

Nolan County: Sun Oil Co. 1 L. P. Cooper, NW NW 19-22-T&P, 6 mi. NW Sweetwater, dry, TD 7,394 ft., elev. 2,380 ft., Valera 2,905 ft., Dotham 3,798 ft., Noodle Creek 3,900 ft., Strawn lime 6,350 ft., Ellenburger 6,840 ft., Hickory sand 7,328 ft.

Parker County: Akin & Dimock 1 C. F. Campbell, C. A. Cabiness Sur., A-248, 8 mi. N Weatherford, dry, TD 3,306 ft., elev. 1,111 ft.

G. E. Kadane & Sons 1 R. T. Land, Sec. 31, T&P Sur., A-1424, 4 mi. SE Springtown, dry, TD 6,820 ft., elev. 768 ft., Caddo 3,200 ft., conglomerate 3,850 ft., Big Saline 5,090 ft., Ellenburger 6,719 ft.

Shackelford County: Ungren & Frazier 1 Dawson & Conway, Luke Bryan Sur. A-7, 15 mi. NW Albany, dry, TD 1,805 ft.

Stephens County: R. W. Fair and Don L. Choate 7 T. A. White, 46-7-T&P, 2 mi. N Leeray, dry, TD 1,868 ft.

Paul & Wm. Moss 1 W. M. Cox, Sec. 2,067, TE&L Sur., 4 mi. E Breckenridge, dry, TD 3,417 ft., elev. 1,307 ft., Caddo 3,206 ft.

Stonewall County: Ohio Oil Co. 1 Frank Antilley "A," E. A. Lee Pre-emption Sur., A-818, 5 mi. S Aspermont, dry, TD 6,256 ft., Valera 2,045 ft., Noodle Creek 2,965 ft., Saddle Creek 3,190 ft., coal 3,245 ft., King 3,590 ft., Ivan 3,650 ft., Swastika 3,678 ft., Chester 6,045 ft., Chappel 6,205 ft., Ellenburger 6,222 ft.

Throckmorton County: L. B. Scott 1 G. R. Ellis Unit 1, on line of Sec. 686-687, TE&L Sur., 1 mi. SW Woodson, dry, TD 4,714 ft.

ROCKY MOUNTAIN

New Wildcat Slated for Northeastern Utah Area

DENVER.—Location has been announced by Carter Oil Co. and Stanolind Oil & Gas Co. for another important wildcat in the Tertiary producing area of northeastern Utah. The new well will be on the Blue Bell unit, totaling 16,650 acres, 10 miles west of the Roosevelt field, and the location is in the CSW NE 6-1s-2w. Carter and Stanolind are now completing unitization on the block and will drill a 9,500-ft. well to the Basal Green River section, productive at the Roosevelt discovery. Carter and Stanolind's Roosevelt well flowed 1,633 bbl. of oil daily, through choke, on initial tests and is now reportedly producing 600 bbl. of light-green oil daily.

The operators have made location and let contract for a second well on the structure, $^1/_2$ mile east of the discovery. The well is 2 Ute-Tribal, CNW SE 21-1s-1e, and it is also scheduled to go to the 9,200-ft. productive zone. The California Co. is now reported drilling below 8,800 ft. at its Gusher Unit wildcat, 5 miles southeast of Roosevelt, with this test a tight hole. The well may be drilled below 10,000 ft. for a test of lower Tertiary zones. Carter reportedly has more than 1,000,000 acres of land under lease throughout the Uintah basin of Utah, and its program in this area has been under way for 4 years. The company drilled four deep, expensive dry holes at its Vernal Unit, adjoining the Roosevelt area on the northeast, prior to drilling at Roosevelt.

Steelco Drilling Co. may have a dry hole in its second well in the Glenrock area, Converse, Wyo. The operator has not released data on the well, which is 1 Robbins, SW SE SW 33-34n-75w, southeast of the discovery well. Casing was cemented at 7,086 ft. a week ago and the operator is reportedly perforating and testing. It is reported, but not confirmed, that there was no result of tests in the Dakota, productive in Phillips Petroleum Co.'s recent completion $^1/_4$ mile east of the 1 Robbins. Steelco's discovery well on this structure was completed flowing from the Muddy sand, but no tests have been reported in this sand at the present well.

Completion of the second gas well in the Huntsman area, Cheyenne County, Nebraska, has been announced by Ohio Oil Co., with the well flowing 34,500,000 cu. ft. of gas daily. The well is 1 Mather, NW SE NW 12-14n-50w, $1^1/_2$ miles northwest of the company's Huntsman gas discovery which was recently completed for a gage of 54,000,000 cu. ft. of gas daily. Production in both wells is from the Third Dakota sand, logged in the Mather at 4,801 ft. The gas is reportedly highly distillate cut. Ohio is also completing its 1 Gurschke, SW NE SE 3-14n-50w, 3 miles northwest of the discovery well, and this well flowed green oil from third Dakota sand. No official completion gage has been announced for this test. The Huntsman pool is located 6 miles southwest of Ohio's Gurley field, where oil was first discovered in western Nebraska last year. At Gurley, Ohio produces oil from the First and Third Dakota sands and seven wells now make approximately 1,200 bbl. of oil daily. Ohio is now drilling another wildcat, 2 miles east of the Huntsman discovery, and a south extension to the Huntsman discovery. The company is reportedly unitizing its gas area at Huntsman prior to additional drilling and plans for marketing its gas in the field.

New locations.—There were 19 new locations in the Rocky Mountains this week, including 11 in Wyoming, 4 in Montana, and 2 each in Colorado and Utah. The Colorado locations were for wildcats in the Denver-Julesburg Basin area. British-American Oil Production Co. has spudded for 1 Segelke, NE NW NE 26-11n-53w, a wildcat in the Armstrong area, Logan County, and Adams Drilling Co. et al are drilling below

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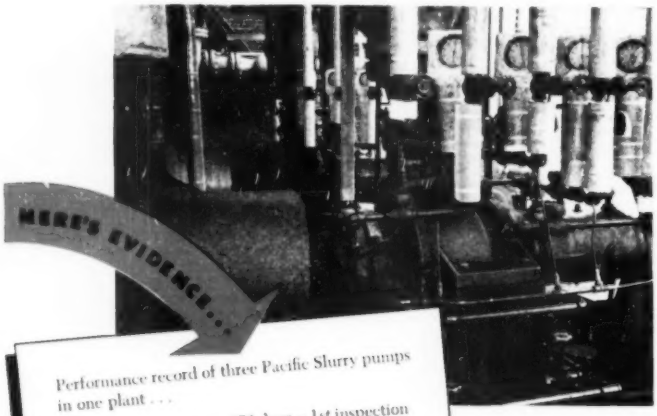

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Total On Stream . . 1110 days—2nd inspection

1st inspection made on 1 pump only. No parts were replaced as the condition of the pump was perfect.

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surface casing at 1 State, CSW NE 16-1s-55w, in the Woodrow area, Washington County.

Completions.—There were 13 completions, with 6 in Wyoming, and 7 in Montana. The three wildcat failures included one stratigraphic test by Phillips Petroleum Co. in its series of tests in the general Pondera-Agawam area, Pondera County, Montana.

WYOMING WILDCAT FAILURE

Crew Creek, Laramie County: John M. Watkins 1 O. Breeden, NE NE NE 9-12n-63w, 253 ft. TD; abnd.

MONTANA WILDCAT FAILURES

Blue Creek area, Carbon County: Ajax Oil Co. 1 Rukavina, NW SE SE 4-6s-24e, 787 ft. TD; completed as a water well; Chugwater 240 ft., Amesden 787 ft.

Pondera area, Teton County: Phillips Petroleum Co. 1 State, NW NE SW 36-27n-5w, 2,173 ft. TD; abnd.

TEXAS GULF COAST

New Wilcox Pool Opened West of Runge Field

HOUSTON—Approximately ½ mile west of the Runge field, Karnes County, Edwin B. Cox and Jake L. Hamon are opening a new Wilcox pool at the 1 A. & L. Schoore. Before setting pipe at total depth of 6,750 ft., drill-stem test was run from 6,554-61 ft. and the well flowed oil in 35 minutes. On another drill-stem test at 6,562-81 ft., using ¼-in. choke, the well flowed oil in 35 minutes, recovering 1,930 ft. of oil. Bottom-hole flowing pressure was 2,290 psi. Operators also found sand from 6,550-66½ ft. The new field discovery is located in the Victor Blanco Survey, Abstract 3, with the San Antonio River.

E. L. Buckley is waiting on state potential at the 1-B Texas Gulf Sulphur, after making completion of the well on the western flank of the Boling dome, Wharton County. The well was gaged for 86 bbl. of 27.8°-gravity oil daily through a 5/32-in. choke, with a flowing pressure on the tubing of 147 psi. Hole is bottomed at 2,221 ft. and production is through perforations at 1,860-80 ft. The well is located in the John Huff League, 1 mile north of Iago townsite.

Humble Oil & Refining Co. has announced plans to drill two 9,600-ft. wildcat tests in the Galveston Bay area. The E-2 Galveston Bay State will be drilled 4 miles southwest of Anahuac in Tract 21-A. Location is 2½ miles west of the shoreline, and approximately 5 miles northeast of Fishers reef. Approximately 1 mile closer to Fishers reef, the E-1 Galveston Bay State will be drilled. It will be 5 miles southwest of Anahuac, 2⅝ miles west of the shoreline in Tract 17-B.

Lloyd H. Smith, Inc., is preparing to run a drill-stem test in the 1 J. V. Meek, Fort Bend County wildcat, Stephen Habermaker Survey, A-189. Test will be run on a broken-sand section cored with oil shows from 6,990 ft.

The 34 new locations include 4 wildcat starts, 1 each in Austin, Hardin, Walker and Bee counties. There were two successful exploratory tests completed, one each in Goliad and Matagorda counties, while two were dry, one each in Matagorda and Wharton counties.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Goliad County: Gas discovery—Morris Mizel and Rock Hill 1 Erwin Landgrebe, Thos. Hancock Sur., A-142, 10 mi. N of Weesatche, ⅝ mile E of Brandt field, TD 8,008 ft., perf. 7,538-45 ft., IP: 10,000,000 cu. ft. of gas, open flow, SITP 2,715 psi.

Matagorda County: New pay at Sargent—H. A. Potter et al 1 Ritta Freeman, Thos. McCoy and D. Deckro Sur., top pay 5,058 ft., TD 6,705 ft., perf. 5,058-

62 ft., IP, 32,500,000 cu. ft. of gas, open flow, TP 2,100 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Matagorda County: Perry R. Bass et al 2 Armour-Duncan, David Fenton League 7, A-33, 3 mi. N of Bay City, dry, TD 9,661 ft.

Wharton County: Trull and Thompson 1 S. Hamberger, WCRR Sur., A-371, 7 mi. W of Wharton, dry, TD 5,030 ft.

PERMIAN BASIN

Kent County Wildcats Holding Much Attention

MIDLAND—Kent County wildcats were holding attention this week, a number of which have reached critical depths. Although it could not be confirmed, field sources credited the Caroline Hunt Trust Estate 1 J. W. Young, located 467 ft. from south and 1,640 ft. from east lines, 166-G-W&NW Survey, with topping the reef at 6,204 ft., or minus 4,116 ft. A core from 6,288-37 ft. recovered 1 ft. of hard lime, bleeding oil, it was said. It was believed to be coring ahead at 6,300 ft. Location of the well is 7½ miles northwest of Clairemont.

Eleven miles west of Clairemont, Lewis T. Lohman and others 1 J. W. Young, NW NW 98-G-W&NW, topped the Ellenburger at 7,842 ft., or minus 5,473 ft. A drill-stem test from 7,855-95 ft., open 1 hour, recovered 7,800 ft. of sulfur water, with no shows. Operators ran electrical surveys and were to set casing to 7,500 ft. and test in the Strawn, which developed some oil and water on drill-stem tests.

Slick-Moorman Oil Co. 1 Wallace, SE NE 28-5-H&GN, 15 miles southwest of Clairemont, recovered 100 ft. of heavily oil and gas-cut drilling mud, plus 2,200 ft. of gas, on a 1-hour drill-stem test at 7,588-7,623 ft. A 70-minute test from 7,623-89 ft. yielded 275 ft. of slightly oil and gas-cut mud. Drilling continued below 7,747 ft., in the Ellenburger topped at 7,588 ft., minus 5,405 ft. Location is about 4 miles north of the Polar Ellenburger field.

In northeast Kent County, William Herbert Hunt Trust Estate 1 Girard Trust Co., SE SE 98-1-H&GN, reported a Pennsylvanian lime at 6,790 ft., minus 4,679 ft. It was drilled to 6,816 ft. and the hole was being conditioned for a drill-stem test.

General Crude Oil Co. 1-A Jones, NW NW 79-G-W&NW, was drilling below 6,070 ft. in sand and shale. Location is ½ mile southwest of Clairemont.

Last week, Castleman & O'Neill 1 Feldman-Pardo, 651-97-H&TC, new reef discovery in north central Scurry County, completed from open hole at 6,740 ft., top of the reef, to 6,883 ft., total depth. On a 6-hour test through ½-in. choke, the well flowed 695.53 bbl. of oil, with no water, for a calculated daily potential of 2,782 bbl. a day.

The same operators made location for an east offset to their new discovery, as the 2 Feldman-Pardo, which is 853 ft. from east and 467 ft. from north lines, southwest quarter, Section 651.

D. D. Feldman Oil & Gas Co. was reported ready to stake a south offset to the 1 Feldman-Pardo. According to reports, Feldman owns lease and minerals under all of the south half of Section 651, except the 80 acres comprising the north half of the southwest quarter of the section which was traded to Castleman & O'Neill.

Progress Petroleum Co. of Texas 1 O. R. Buffaloe, 565-97-H&TC, completed last week flowing 436 bbl. of oil a day through 5/8-in. choke, from open hole below 5½-in. casing set at 6,782 ft. Flowing pressures were 320 psi. on tubing and 550 psi. on casing, with gas oil-ratio of 730 cu. ft. Gravity of the oil was 41.5°, corrected. Location is 3 miles north of the North Snyder field and 2½ miles southwest of Castleman & O'Neill 1 Feldman-Pardo.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCAT

Borden County: George P. Livermore, Inc. 1 W. Reinecke, NW SW 53-25-H&TC, 18 mi. SE Gail, 5½ mi. SW Amerada 1 Von Roeder, Canyon reef discovery, TD 6,798 ft., elev. 2,348 ft., reef lime 6,756 ft., IP flowed 1,530 bbl. 46°-gravity oil a day, ¾-in. choke, GOR 1,297 cu. ft., TP 480 psi., CP 735 psi.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: Bay Petroleum Corp. 1-A-X L. A. Pearce, 35-31-T5N-T&P, 1 mi. W Gail, dry, TD 8,411 ft., elev. 2,695 ft., anhydrite 1,210 ft., Yates 1,900 ft., San Andres 3,080 ft., reef lime 8,270 ft.

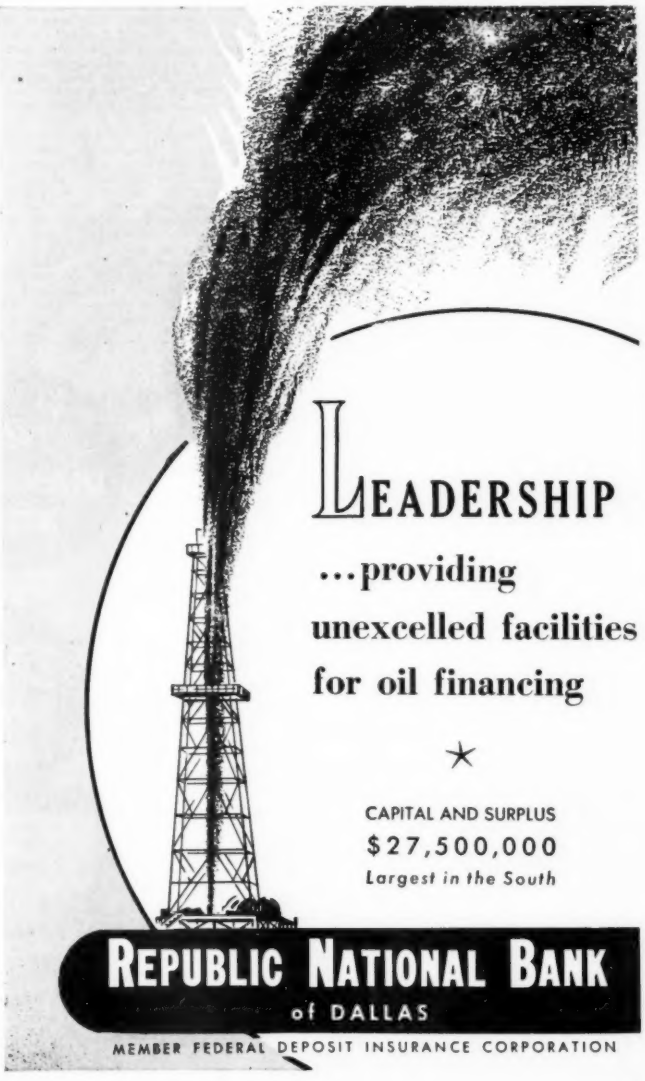
Standard Oil Co. of Texas 1 T. L. Griffin "6," NW NW 35-25-H&TC, on Howard-Borden county line, 6 mi. NW Vincent, 6 mi. due W Magnolia 1-A Gartner, dry, TD 8,923 ft., elev. 2,406 ft., San Andres 2,580 ft., Clear Fork 3,304 ft., Wolfcamp 6,676 ft., Canyon 7,594 ft., Strawn 7,780 ft., Mississippian 8,630 ft., tentative Devonian 8,816 ft., Ellenburger 8,830 ft.

Crockett County: Humble Oil & Refining Co. 1 Alma Cox, 3-OR-D&SE, 3½ mi. SW Ozona, dry, TD 8,221 ft., elev. 2,542 ft., Wolfcamp 7,380 ft., Devonian 7,440 ft., Ellenburger 7,707 ft.

Irion County: M. C. Moore 1-A W. M. Noelke Estate, Tom Green CSL Sur., 14 mi. SW Mertzon, dry, TD 1,502 ft., elev. 2,381 ft.

Midland County: York & Harper, Inc. 1-A TXL, NE SW 25-39-T3S-T&P, 13 mi. S Midland, dry, TD 13,250 ft., PB 7,760 ft., elevation 2,714 ft., anhydrite 1,630 ft., Yates 2,615 ft., Grayburg 4,358 ft., Strawn 10,665 ft., Devonian 12,000 ft., Fusselman 12,665 ft., Simpson 12,870 ft., Ellenburger 13,130 ft.

Runnels County: Delaware Drillers, Inc. 1



Vernon Dankworth, J. Wall Sur. 378, 4 mi. SE Ballinger, dry, TD 4,891 ft., elev. 1,651 ft., Valera 962 ft., Palo Pinto 3,677 ft., Strawn 3,610 ft.

Woods Drilling Co. 1 Dale, EL&RR Sur 7, 3 mi. SE Winters, dry, TD 4,686 ft., elev. (?), Saddle Creek 2,098 ft., Gunsight lime 2,450 ft., Home Creek 2,975 ft., Palo Pinto 3,525 ft., Ellenburger 4,540 ft.

Scurry County: L. M. Lockhart 1 J. S. Criswell, SE SE 625-97-H&TC, NE corner of county, dry, TD 7,440 ft., elev. 2,185 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Magnolia Petroleum Co. 2-A Betenbaugh, east extension to the Bough field, in SE SW 12-9s-35e, was drilling lime below 7,733 ft. A drill-stem test in the San Andres from 4,800-50 ft., open 2 hours and 20 minutes, recovered drilling mud and sulfur water.

Forest Oil Corp. 1 Barnes & Curtis, 26-92-35e, originally completed dry at 5,316 ft., and now scheduled to 10,000 ft., was drilling lime and shale at 8,356 ft. On elevation of 4,121 ft., it had top of the Glorietta at 5,490 ft., and the Abo at 7,760 ft. Location is 2 miles south of production in the Bough field.

Magnolia 1-B Walker, 6-9s-36e, 1½-mile northeast stepout to the Bough area, was drilling at 5,000 ft. Top of the San Andres at 4,090 ft. was about 22 ft. high to the discovery well.

The Texas Co. 1 Ertel, wildcat northwest of Devonian production in the Knowles area, was drilling below 13,098 ft. in lime, identified as the Mississippian. Location is NE NW 27-16s-38e.

Shell Oil Co. 1 W. V. Lawrence, SE SW 32-17s-39e, 6 miles northeast of the Hobbs field, was drilling below 13,624 ft. in lime. Tops reported were: Pennsylvanian 10,500 ft., Mississippian 11,020 ft., Devonian 11,858 ft., Woodford shale 11,770 ft., Silurian 12,820 ft., and the Montoya 13,285 ft. Elevation is 3,646 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Chaves County: Humble Oil & Refining Co. 1-Y State, NW SE 33-11s-27e, dry, TD 7,430 ft., elev. 3,708 ft., San Andres 1,240 ft., Glorietta 2,468 ft., Yeso 2,550 ft., Abo 4,770 ft., Brunson 5,579 ft., Mississippian 6,546 ft., Devonian 6,838 ft., Ellenburger 7,142 ft., Cambrian 7,411 ft.

Eddy County: Ralph Nix 1 Nix-Hall, SE SE 21-21s-29e, dry, TD 3,334 ft., elev. 3,420 ft., salt 543-2,812 ft., Delaware sand 3,260 ft.

KANSAS

Arbuckle Lime Pays Off In Ellis County Wildcat

LINDAS OIL CO. and Aledo Oil & Gas Co. are opening another Arbuckle lime pool in southern Ellis County where their 1 DeChant, SW SW SW 6-15-18, 1½ miles southeast of the Antonio Townsite pool, is being put on the pump for completion after swabbing 10 bbl. of oil per hour. Arbuckle was cut at 3,670 ft. (—1,600 ft.), and casing, run through the pay, was perforated at 3,675-77 ft.

About 4 miles to the north and a mile southeast of the Wheatland pool, same county, Jones, Shelburne and Farmer have another prospective Arbuckle pool. Their 1 Campbell, NE NE NE 30-15-17, got good showings in this formation, topped at 3,557 ft. (—1,580 ft.), and has 5-in. oil string at 3,359 ft., preparatory to testing. Rotary hole was drilled to 3,361 ft.

Westgate-Greenland Oil Co. 1 Doran, SE NE NE 14-21-13, 1 mile east of the Rothgarn pool in north central Stafford County, swabbed 2 bbl. of oil per hour, after acidizing, while testing Arbuckle lime, topped at 3,544 ft. (—1,677 ft.). Hole was drilled to 3,553 ft. in the pay.

Franco Central Oil Co. 1 Kortman, SW SW NE 22-12-14, a wildcat located 1½ miles northeast of the Claussen pool, Russell County, swabbed oil and some water in testing two different zones in the Lansing-Kansas City lime, and at latest report was preparing to perforate casing higher in the formation for additional tests. First test was through perforations at 3,158-61 ft., from which the well swabbed 5 bbl. of oil and 7 bbl. of water per hour. Second test was from perforations at 3,068-72 ft., where it swabbed 8 bbl. of oil and 12 bbl. of water per hour. Casing had been run to 3,276 ft. in Arbuckle, topped at 3,274 ft. The latter pay, drilled to 3,280 ft., proved dry. Lansing was cut at 2,961 ft. (—1,161 ft.).

The Southwest Zyba pool, Sumner County, has been extended a quarter-mile to the north by Kirchner & Sullivan 1 Chitwood, SE SW NE 15-30-1w, completed with a potential rating of 3,000 bbl. per day (maximum) potential from Simpson sand at 3,883-99 ft. (—2,620-36 ft.).

KANSAS SUCCESSFUL WILDCATS

Barton County: Extension to Dundee—Kansas-Nebraska 1 Unruh, SE SE SW 17-20s-14w, 1,400,000 cu. ft. of gas per day from Arbuckle at 3,576-86 ft., TD 3,621 ft.

Stafford County: Stableford 1 Harter, NE NE SW 30-24s-13w, 84 bbl. of oil per day from Simpson sand at 4,167-71 ft., TD 4,250 ft.

KANSAS WILDCAT FAILURES

Butler County: Douglas area—Copeland et al 1 Roew, NE NE NE 17-29s-4e, dry, TD 2,937 ft., base Kansas City 2,360 ft., Mississippi lime 2,705 ft., Arbuckle 2,933 ft.

Nemaha County: Davon 1 Swart, NW NW NW 26-3s-13e, dry, TD 2,454 ft., Decorah 2,357 ft., St. Peter 2,401 ft.

Rooks County: B & R 1 Hunt, SW SW NE

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19-7s-18w, dry, TD 3,455 ft., Lansing-Kansas City 3,091 (?) ft., Sooy 3,402 ft., Arbuckle 3,421 ft.

Russell County: Jones-Shelburne & Farmer 1 Houser, SW NE NW 8-11s-14w, dry, TD 3,552 ft., Arbuckle 3,517 ft.

Fairport area—Aylward 1 Reich, NW NW SW 15-11s-15w, dry, TD 3,423 ft.

Sedgwick County: Eckland 1 Wood, SE SW NE 33-27s-1w, dry, TD 3,730 ft., Mississippi chat 3,324 ft., Simpson 3,680 ft.

Wabaunsee County: Emery 1 Reichman, SW SW NE 26-12s-9e, dry, TD 3,135 ft., Maquoketa 3,022 ft., Viola 3,115 ft.

Ajax 1 McKnight, NE NE SW 16-14s-12e, dry, TD 3,223 ft., Decorah 3,100 ft., Simpson dolomite 3,105 ft., St. Peter 3,139 ft., Arbuckle 3,182 ft.

SOUTHWEST TEXAS

Major Field Opened in San Patricio County

CORPUS CHRISTI.—A major South Texas oil field has been opened by Superior Oil Co. in San Patricio County, 5 miles northeast of Sinton. The company's 1 Minnie S. Welder, Section 24, Welder Ranch Subdivision, was completed for 507 bbl. of 39.1 -gravity oil daily through a 14/64-in. choke. Tubing pressure was 1,350 psi, and gas-oil ratio was 728. The well is bottomed at 8,822 ft., with 7-in. casing cemented at 8,500 ft., and production is through perforations at 8,122-32 ft.

Superior is now drilling below 1,450 ft. in the 2 Welder, 4,100 ft. southwest of the pool discovery.

Producers Corp. of Nevada topped the Edwards lime in the 1 E. S. Austin, a wildcat test in the A. Winn Survey, Gonzales County. On drill-stem test at 6,095-107 ft., recovery was 450 ft. of oil and sulfur water, being 2 per cent oil and 30 ft. of rathole mud. Bottom-hole flowing pressure was 145 psi. Operators are now drilling ahead at 6,175 ft.

The Texas Co. recovered 60 ft. of gas-cut mud on a drill-stem test from 1,315-22 ft. in the 1 Duval County Ranch Co., wildcat test approximately 1½ miles northeast of the North Casa Blanca field, Duval County. Operator used a ¼-in. top and no bottom choke. Now at a total depth of 1,529 ft., operators are straightening hole.

W. M. Jarrel ran a 15-minute drill-stem test from 3,350-65 ft. in the 1 L. V. Coupland, wildcat test 6 miles south of Taylor in Williamson County, and recovered 2,764 ft. of mud and fresh water. Operator is now drilling ahead at 3,470 ft. Test is located in the BBB&C Co. Survey.

The 40 new locations include 12 wildcat starts, 1 each in Jim Hogg, Nueces, Starr, Atascosa, Bastrop, Bexar, Edwards, Frio, and Guadalupe counties, and 3 in Duval County. There was one successful exploratory test completed in San Patricio County, while nine were dry, one each in Duval, Jim Hogg, Webb, Burnett, McMullen, Travis and Williamson counties, and two in Bastrop County.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

San Patricio County: New oil pool—Superior Oil Co. 1 Minnie S. Welder, Sec. 24, Welder Ranch Subdivision, 5 mi. NE of Sinton, top sand 8,122 ft., TD 8,822 ft., IP: 507 bbl. oil per day, 14 64-in. choke, GOR 728, TP 1,350 psi., 39.1 gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bastrop County: Sol Kopel 1 Lee Alexander, James B. Blalock Sur., 2 mi. N of Lytton Springs, dry, TD 2,108 ft.

Bastrop County: H. F. Goff 1 Charles G. Caldwell, Antonio Navarro Sur., 12 mi. W of Bastrop, dry, TD 2,288 ft.

Burnett County: Westates Petroleum Corp. of Texas 1 Mrs. Ruth Smith and Auby Brown et al, Mrs. N. E. Rogers Sur. 3,054, 12 mi. SE of Lampasas, dry, TD 1,950 ft.

Duval County: Louis H. Haring, Jr. 1 Altha G. Black, J. Poitevent Sur. 129, 2 mi. N of No. Chiltipin field, dry, TD 4,909 ft.

Jim Hogg County: Morris Cannan 1 Jos. Gruy, Trustee, Noriacitas Gr., V. Kohler Subd., dry, TD 4,520 ft.

McMullen County: Harold K. Boysen 1 Walker, BS&F Sur. 128, A-1,187, dry, TD 2,224 ft.

Travis County: E. R. Marts 1 Cora A. Byrne, Jose Antonio Navarro Sur., 12 mi. SE of Austin, dry, TD 1,561 ft.

Webb County: J. M. Anderson et al 1 Marshall Bros., Rusk Transportation Co. Sur. 674, 12 mi. NW of Bruni, dry, TD 2,430 ft.

Williamson County: George P. Prewitt, J. Frank Smith and Alvin Randig 1 Ben Thonig, Robbins Pasture Sur., 2 mi. SE of Taylor, dry, TD 1,265 ft.

MICHIGAN

Production Tests Started On Muskegon County Oiler

MOUNT PLEASANT.—With tubing and rods run, adequate tank storage set, and other conditions proper, first continual production tests at Kenneth A. Fox's 1 Gee, SE SW NE 15-12n-18w, White River Township Dundee oil discovery, Muskegon County, were started March 8.

After approximately 8 bbl. of water had been lifted from the Dundee pay by pumping, the well "kicked off" and started to flow at the rate of 10 bbl. of oil an hour. Two grind-out tests several hours after

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well started to flow showed no water cut. It was believed that what water had shown was in the hole when 7-in. casing was run and prior to completion in the Dundee formation.

Dundee objective was topped at 2,048 ft. and hole is presently bottomed out at 2,055 ft. Pay showed at 2,053-55 ft. and hole filled to flow-point in 3½ hours after pay was tapped. On first flow test through the control head and from a 7-in. hole, well produced 100 bbl. of oil in 8 hours after which time it was shut in.

Gravity tests indicated that oil was about 26° gravity, but operator said that the grade of crude appeared to be improving with more and continual production tests and that another gravity test was being made.

A statement here last week that this well appeared to be the second well in the township to be drilled to the Dundee was in error. There have been four other Dundee test wells, one Traverse well, one Red Rock test, and two core holes drilled in White River Township besides this new potential discovery. Dundee tests have been drilled in Sections 2, 3, 11, and 24. The Traverse test was drilled in Section 10 and the Red Rock test and core holes were drilled in Sections 10 and 15.

Fox and associates plan to start an offset-drilling campaign in the area immediately on the 3,000-acre block owned by the group in the area.

MICHIGAN WILDCAT FAILURES

Allegan County, Salem Township: Cook Drilling Co. 1 Hutty, NE SW NW 35-4n-13w,, Traverse 1,686 ft., dry, TD 1,727 ft.

Kent County, Caledonia Township: Fisher-McCall Oil & Gas, Inc. 1 Good, NW SW SW 27-5n-10w, Traverse 1,923 ft., Monroe 2,235 ft., dry, TD 2,270 ft.

Oceana County, Golden Township: J. W. Lang Co. and Robert W. Devine 1 Graham, SW SW NW 23-15n-18w, Dundee 2,294 ft., dry, TD 2,352 ft.

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EASTERN TEXAS

Humble to Ream at Gas Test in Freestone County

DALLAS.—Humble Oil & Refining Co. 1 Steward Mill Gas Unit, James James Survey, A-333, 8,000-ft. Pettit test in the Steward Mill field of Freestone County, had total depth at 8,123 ft. in sand and shale, and was preparing to ream. Operators reported 2 ft. of sand in the middle of a 49-ft. recovery at 8,025-75 ft. showing faint odor on fresh break; and at 8,075-8,123 ft., recovery was 47 ft., being 96 ft. of hard, tight sand with no shows, 4 ft. of the same with slight gas odor on fresh break, and the balance a reddish-brown sand, hard and tight, with streaks of green sand.

Magnolia Petroleum Co. 1 A. F. Payne, Hopkins County wildcat 4 miles southeast of Pickton in the Ollen Odom Survey, A-723, had total depth at 7,864 ft. in lime and was to make a second drill-stem test attempt. A core from 7,820-64 ft., in the Pettit, had some porosity and fair to good stains and odor. Top on the Pettit was not determined. On elevation of 513 ft., the first anhydrite stringer was 7,543 ft., by samples, and top of the Massive anhydrite was 7,701 ft.

In Nacogdoches County, Humble 1 Mrs. Ruth Frank, Jefferson Wilson Survey, A-59, southeast of Douglas, had total depth at 9,335 ft. in shale and lime and was reaming. On elevation of 367 ft., tentative markers were: James 8,503-13 ft. to 8,663-73 ft., by samples; Pettit 8,753 ft., established by cores, and top on the transition zone around 9,200 ft., by cores.

In the Trawick field of Nacogdoches County, Humble 1 Trawick Gas Unit 2, Luis Sanchez Survey, A-50, had total depth at 7,929 ft., and had installed a blowout preventer.

In Shelby County, 6 miles east of Patroon, R. L. Milam and others 1 W. A. Bridges, R. S. Forges Survey, A-211, was reworked and completed as a flowing oil well from Georgetown perforations at 3,650-54 and 3,656-60 ft. Initial potential was 89 bbl. of clean, 38°-gravity oil a day, through 12/64-in. choke, under tubing pressure ranging from 300-900 psi., and casing pressure of 1,470 psi.

The 1 Bridges, a wildcat, was originally completed dry in December 1948 at 6,015 ft. It was cleaned out to 4,965 ft. and plugged back to 3,640 ft. Side-wall cores were taken from around 2,500 ft. to 3,730 ft.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Cass County: W. A. Patterson 1 R. C. Connor, Solomon Hines Sur., ½ mi. W Avinger, dry, TD 3,676 ft., elev. 400 ft., Saratoga 2,425 ft., Georgetown 3,952 ft., Comanche 4,030 ft.

Denton County: Will-Flew Oil Corp. 1 R. C. Freeman, W. G. Hudson Sur., A-563, 4 mi. W Sanger, dry, TD 1,751 ft., oil show 1,490-1,503 ft.

Ellis County: Thomas M. Nowlin, Jr., 1 T. W. Christian, H. H. Swisher Sur., 2½ mi. NW Ennis, dry, TD 3,615 ft., Austin 355 ft., Georgetown 1,572 ft., Glen Rose 2,293 ft., Travis Peak 3,393 ft.

Falls County: Lewis, Hamilton & Bost 1 Francis K. Davis, Pedro Zarza Grant, 14 mi. S Waco, dry, TD 936 ft., bailed light show of oil.

Hopkins County: W. B. Hinton 1 G. L. Henderson, U. M. Aiguier Sur., 12 mi. N Sulphur Springs, dry, TD 8,272 ft., elev. 525 ft.

Limestone County: W. M. Coats 2 Claude Nussbaum, Pedro Varela League, 8½ mi. SW Mexia, dry, TD 2,504 ft., Pecan 660 ft., Austin 1,640-2,022 ft., Woodbine 2,281 ft., Buda 2,490 ft.

Navarro County: Nelson & Edward Morris, Ltd. 1 E. F. Bain, Richard D. Newman Sur., 5 mi. NW Kerens, dry, TD 3,512 ft., elev. 395 ft., Pecan Gap 1,607-1,765 ft., Austin 2,455-2,907 ft., Navarro 736 ft.

Red River County: M. H. Harrell 1 Catherine Cobb, Jacob Gregg Sur., 6 mi. E Clarksville, dry, TD 2,556 ft., elev. 432 ft., Blossom 610-620 ft., Woodbine 1,465 ft., oil show at 2,050 ft. thought to be Paluxy.

Stratton Drilling Co., Inc. 1 Thomas E. Allen, Wm. Becknell Sur., 1 mi. SW Bagwell, dry, TD 1,938 ft., elev. 483 ft., Georgetown 1,782 ft., Paluxy 1,825 ft.

Frank Stratton 1 Mrs. Clare B. Evans, Wm. Becknell Sur., 1 mi. SW Bagwell, dry, TD 1,789 ft., elev. 495 ft., Goodland 1,768 ft. (last reported as pumping 15 bbl. oil and shut in for tanks and connections).

Van Zandt County: J. F. Huntley 1 L. S. Hardegree, R. W. Berry Sur., A-109, 2 mi. NW Ben Wheeler, dry, TD 4,016 ft., elev. 515 ft., Pecan 2,720 ft., Austin 3,940 ft.

Wood County: Allen Guiberson & R. J. Caraway 1 C. E. Burkett, J. B. Mansell Sur., in Pine townsite, 110-acre tract, dry, TD 6,640 ft. in base of the Woodbine, elev. 482 ft.

MISSISSIPPI

Operator to Test Adams County Wildcat Venture

JACKSON.—J. D. Reese is preparing to test 1 George Armstrong, 19-5n-3w, Adams County, after drilling the well to a depth of 7,022 ft. and setting 5½-in. casing to 6,656 ft. Testing will be from 7 ft. of oil show which was sidewall cored from top part of sand body 6,594-621 ft. Schlumberger log and sidewall samples indicate oil-water contact within the sand body which may make completion operations difficult. Oil shows were also encountered in top of Sparta at 3,608-28 ft. and in sand at 5,039-45 ft., which is approximately the "4,600 ft." zone of the Wilcox at LaGrange field. This prospective Wilcox discovery is approximately 5 miles northwest of Ellislie field.

Also in Adams County, approximately 1½ miles northwest of Ellislie field, Humble Oil & Refining Co. 1 Alberta Robinson, 20-5n-3w, has been officially completed on pump as an oiler through perforations at 6,406-10 ft. On initial potential, the well flowed 190 bbl. of fluid per day, of which 85 per cent was 29.1°-gravity oil.

Carter Oil Co. 1 J. L. Wilson, 30-12-3e, Travis Peak discovery in the Pickens field area, Yazoo County, is dead and shut in, and operators are waiting on orders. After the well died, it was swabbed a total of 1½ days, but operators were never able to get the swab near bottom. At present, it is undecided whether to install pumping equipment or move in work-over rig and squeeze and reperforate.

In Clarke County, Alabama, Humble Oil & Refining Co. is reported to have run several drill-stem tests on the 1 Marion Davies, 15-3n-2e, and on each test an undetermined amount has been recovered. However, no definite information has been released by the operator, the well has created considerable interest after it recovered 20°-gravity oil on drill test in the Lower Tuscaloosa.

The eight new locations in Mississippi include four wildcat starts, one in Jefferson and three in Adams County. There was one successful exploratory test completed in Adams County, while two were reported dry, one each in Adams and Simpson counties. Alabama had one dry wildcat completed in Walton County, while another was being staked in Simpson County.

MISSISSIPPI SUCCESSFUL WILDCAT

Adams County: New oil discovery—Humble Oil & Refining Co. 1 Alberta Robinson, 20-5n-3w, top sand 6,406 ft. (Armstrong sand of Wilcox) TD 7,116 ft., perf. 6,406-

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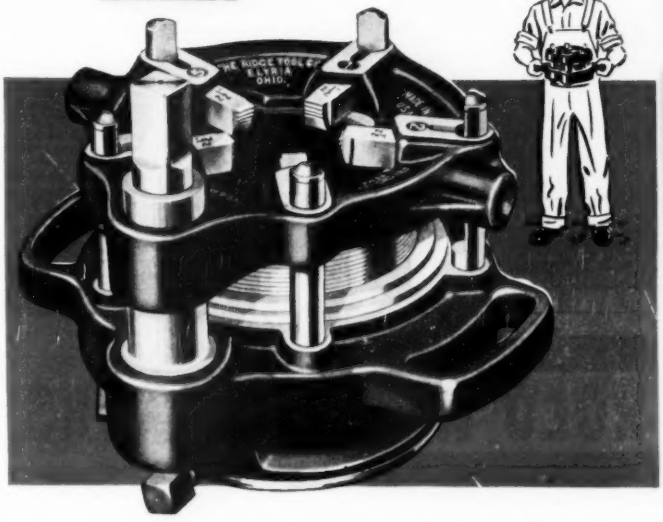

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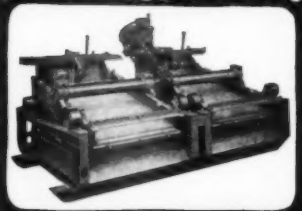

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MISSISSIPPI WILDCAT FAILURES

Adams County: Elliott-Kemp 1 R. L. Parker, 70-7n-2w, dry, TD 6,682 ft.

Simpson County: Roeser & Pendleton, Inc. 1 Gaylord Container Corp., 22-2n-3e, dry, TD 9,354 ft.

ALABAMA WILDCAT FAILURE

Walton County: The Texas Co. 1 Walton Land & Timber Co., 17-1s-18w, dry, TD 5,514 ft.

LA.-ARK.

Sinclair's Cotton Valley Test Below 2,175 Ft.

SHREVEPORT.—Sinclair Oil & Gas Co. 1 Vera Oden, new Cotton Valley test located on a subsurface prospect 5 miles north of Bossier City, in SE NE 33-19n-13w, Boosier Parish, had set surface casing and was drilling below 2,175 ft. Proposed depth was not made known.

Bert Fields 1 Thigpen-Herold, 23-16n-16w, Cotton Valley wildcat in Caddo Parish, reported sample top on that formation at 8,220 ft., on elevation of 264 ft. A core from 8,516-96 ft. recovered lime and shale with no shows. Drilling continued below 8,597 ft.

In the Caspiana gas field of Caddo Parish, Isbrandtsen & Co. 1 Hutchinson, 17-15n-12w, completed in the Rodessa for 4,750,000 cu. ft. of gas a day, plus 13½ bbl. of distillate per 1,000,000 cu. ft. of gas. Perforations were from 4,432-58 ft. The above gage was open flow, under rock pressure of 1,900 psi.

Barnsdall Oil Co. and others 1 Worley, east of the Cykesville field in 5-22n-8w, Claiborne Parish, had total depth at 6,052 ft. in the Travis Peak, and stopped to run casing. Cores from 5,678-5,779 ft. recovered oolitic lime and shale with no shows. On elevation of 298 ft., sample tops were: Pettit 5,661-70 ft., and Travis Peak 5,847 ft.

Gulf Refining Co. 1 Kinnebrew, 26-20n-7w, Athens field deep test, had total depth in the Smackover at 11,513 ft., plugged back to 8,450 ft. in the Cotton Valley. From perforations at 8,148-86 ft. and 8,208-22 ft. (Davis sand), the well flowed at the rate of 166 bbl. of 60°-gravity oil a day, plus 1,800,000 cu. ft. of gas, through 12 64-in. tubing choke. Flowing tubing pressure was 2,275 psi., and 2,660 psi. shut in.

CANADIAN FIELDS

Pacific Petroleums Well Has Encouraging Show

CALGARY.—Pacific Petroleums, Ltd., and associates obtained oil encouragement in the D3 Devonian coral reef at their key test on an Imperial Oil, Ltd., farmout lease located about 1¾ miles due west of the present northwest producing limits of the Redwater field. The well, 1 Calvan-Pacific-Opal, is in LSD 13-58-23w4.

The 1 Opal found D3 reef 61 ft. above the Redwater water line, but did not enter porosity until over 50 ft. was penetrated. At the weekend drill-stem test of interval 3,326-36 ft., 1 hour in duration, the well gave 960 ft. of clean oil, with no sign of water. Coring and testing is being continued.

Meanwhile, another Pacific group well, 2 Selburn-Calvin-Pacific, LSD 1, 34-56- 21w4, 2 miles west and 1 mile north of the 1 Imperial-Simmons discovery well, topped D3 zone of Devonian 157 ft. above the water line and entered excellent oil-bearing porosity 20 ft. in the reef. The well will probably complete next week with assurance of one of the thickest pay zones yet found at Redwater. The Simmons well, which found the thickest Redwater D3 zone to date, topped the zone 191 ft. above the water line. By the weekend 2 Pacific had cored and tested to 3,174 ft., 50 ft. in D3.

Imperial 6 Golden Spike, LSD 3, 22-51-27w4, extension effort ½ mile south and ½ mile west of 1 Imperial-Schoepp discovery, is logging somewhat lower than the Imperial successes to the northeast and has found salt water in D2 zone drill-stem test. On drill-stem test of D2 zone interval 5,216-61 ft., the 6 gave up 2,250 ft. of salt water and 90 ft. of mud. Drilling is now proceeding below 5,276 ft., in search of D3 zone—the objective that gave up 560 ft. of oil zone at the three Imperial successes.

At Excelsior 2 Imperial-Excelsior, LSD 4, 10-56-24w4, ¼ mile north of the discovery well, is being prepared for production after penetrating around 129 ft. of D2 productive pay zone in the Devonian. Casing and liner has been set at 2 Excelsion and production tests will likely be run next week.

Oil City Petroleum, Ltd., has found considerable crude oil and some salt water in the D2 at its initial effort in the South Leduc extension area. The Oil City Pete-Leduc, LSD 7, 21-49-26w4, contacted top of D2 at 5,338 ft., and tested in the upper portion, receiving 1,550 ft. of oil plus 550 ft. of salt water. Maximum natural-flow rate during test was 146,000 cu. ft. daily. A further test at around 5,386 ft. gave 900 ft. of clean oil and 900 ft. of salt water. Coring and testing is proceeding. The well is located about 1½ miles south of the South Leduc oil pool opened up last year by Okalta Oils, Ltd.

Ten more wells completed in Alberta this week, including nine oil producers and one wildcat hole, to raise the score for 1950 to 103 completions during the 69-day period January 1 to March 10. The completions included 72 oil wells, in half a dozen fields, five discovery gas wells, and 26 dry holes.

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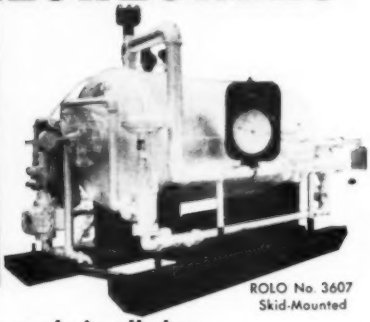

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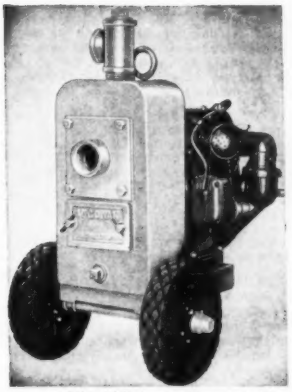

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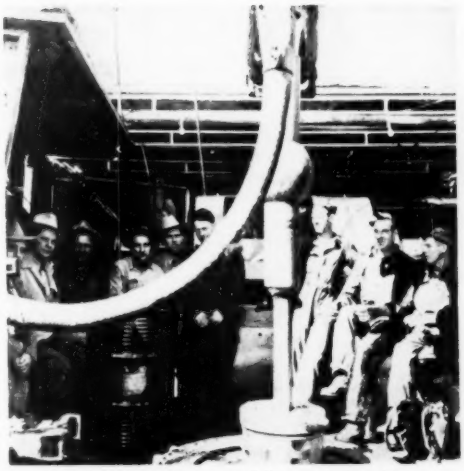

Left to right are the names of the men in the picture. Doug Silvey of Heard & Silvey, Champion Q-X Distributor; V. V. (Doolittle) Thomanson, Drilling Supt. of B. B. M. Drilling Comany; Dutch Higenheiser, Tool Pusher; T. G. Brown, Driller; Harry Lewis, West Texas Champion Q-X Rep.; Red Cannon, Motorman; Grover Williams, Helper; W. L. Hughes, Helper; and J. C. Driver, Derrickman.

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This week's completions include seven oil wells at Redwater, one at Leduc, one at Excelsior, and an exploratory dry hole in northwest Alberta. The count for the year to date: Redwater, 45 oil wells and one failure; Leduc-Woodbend, 20 oil wells and three failures; Excelsior, three oil wells and two failures; Stettler, two oil wells; Golden Spike, one oil well; Turner Valley, one oil well; gas discoveries, one each at Oyen, Battleview, Cardiff, Spedden and Waybrook; and 20 exploratory dry holes, scattered over Alberta.

Eleven new locations were staked in Alberta this week, including eight field wells and three wildcats. Four field sites are at Leduc, two at Redwater, one in Turner Valley, and one at Excelsior. The wildcats are at Gibbons and Spedden, in central Alberta, and Red Willow, in south central Alberta.

CANADIAN WILDCAT FAILURE

Shell-Runaway Lake No. 1, LSD 16, 25-86-20w5, TD 6,075 ft.

ILL.-IND.-KY.

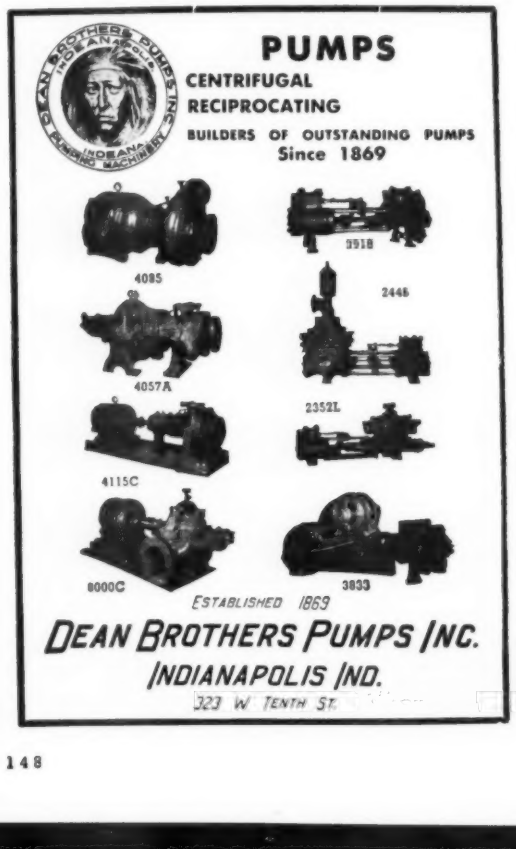
Pump Tests Started At Dubois County Wildcat

B & J DEVELOPMENT CO.'s oil discovery well in Dubois County, Indiana, has been put on the pump after swabbing tests, and at latest report was making 75 bbl. of oil with about 5 bbl. of water per day. The well, 2 J. F. Hochgesang, E½ SW NW 7-2s-4w, is located about 2 miles southeast of Jasper, in the central part of the county. A rank wildcat, it not only establishes first commercial oil production in this county, but is 18 miles from nearest other production, located in Pike County to the west. Some small shallow production, now abandoned, at one time existed about 15 miles to the southeast in the extreme southeastern corner of the county at the junction of Crawford and Perry counties. Production in the new well is from McClosky lime found at 669-83 ft. with bottom of the hole at 689 ft. Before testing, the pay zone was treated with 500 gal. of acid.

About a mile south of the Ford pool, in Posey County, southwestern Indiana, Ashland Oil & Refining Co. and Dee Miller Drilling Co. are establishing some additional new production at their 1 Appell et al., SE NE NE 28-6s-12w. Testing Cypress sand at 2,307-19 ft., this well swabbed initially at the rate of 25 bbl. of oil naturally. Later, after a 15-qt. nitro shot, it made 83 bbl. of oil with about 20 bbl. of water in a 22-hour swabbing test.

The location is about 2 miles north of the new Cypress sand pool opened about 2 weeks ago by Superior Oil Co. The latter's discovery well, 1 Philip Jordan, SE SW NW 4-7s-12w, is located between the Stooker and East Stooker pools. It had the pay at 2,290-2,300 ft. and pumped about 50 bbl. daily initially. Since its completion, a north offset, Superior 2 Jordan, has been found dry after drilling to 2,309 ft. However, a confirmation of the discovery has been made at south offset, Walter Duncan 1 Lydia Noelle, NE NW SW 4-7s-12w, which has the pay at 2,285-95 ft. and has been put on the pump producing about 81 bbl. of oil and 20 bbl. of water daily. Duncan is starting an east offset to the discovery well at his 1 Barter, SW SE NW 4-7s-12w.

Testing of Henson Drilling Co.'s prospective discovery well, 1 Richison, NE SE SE 29-1n-5e, 1½ miles southwest of Orchardville, in Wayne County, Illinois, has been started but, as this is written, no gage of production has been made. It is testing McClosky lime at 2,901-06 ft., in which pay a previously reported drill-stem test, taking in an interval at 2,897-2,905 ft.,



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yielded 220 ft. of clean oil and 10 ft. of oil-cut mud without any trace of water. This discovery is about 2½ miles southwest of production in the Zenith South pool, opened last July and in which development so far has resulted in the completion of 12 good wells.

Production of the New Harmony-Keensburg Consolidated pool, Wabash County, Illinois, is being extended further westward at its northern end by C. E. Skiles 1 Edwin Schmidt, located 990 ft. north and 1,515 ft. east of the southwest corner of 18-2s-13w. The well is being put on the pump after swabbing tests of O'Hara lime at 2,812-22 ft. In the latter tests, the well made about 5 bbl. of oil per hour after acidizing. Bottom of the hole is 2,900 ft.

At the north end of the Inman West Consolidated pool, in Gallatin County, Illinois, E. F. Moran, Inc., 1 Joseph Fromm, SW SE SW 31-7s-10e, swabbed 30 bbl. of oil per day natural while testing the Hardinsburg sand, a new pay zone for that immediate area. Pay is at 2,311-22 ft. Other production in the area is mainly from the Cypress sand. A south offset, Sam Gilpin 2 Fromm, NW NE NW 6-8s-10e, is being started.

ILLINOIS SUCCESSFUL WILDCAT

Richland County: N. C. Davis 1 B. Wilson, SW NW SW 4-4n-10e, IP 12 bbl., McClosky 2,889-97 ft., TD 2,985 ft. (Extension Clay City-Noble Consolidated pool.)

ILLINOIS WILDCAT FAILURES

Edgar County: Slemaker & Cobb 1 J. A. Helfrick, SE SE NW 14-14n-14w, dry, TD 440 ft.

Madison County: Joe Kesl, Jr., 1 Wolf, NW NE SW 32-6n-6w, dry, TD 580 ft.

Saline County: M. E. Affeld 1-A Ely Gholson, NW NW NE 33-7s-7e, dry, TD 3,116 ft.

Shelby County: P. Doran et al., 1 York, NE NW NW 13-11n-5e, dry, TD 2,205 ft.

INDIANA WILDCAT FAILURES

Daviess County: B.L.S. Drilling Co. 1 C. W. Ellis, SW SW NE 13-4n-7w, dry, TD 1,305 ft.

C. F. Robb 1 B. E. Meyer, SW NE SE 10-4n-7w, dry, TD 1,391 ft.

B.L.S. Drilling Co. 1 Christy, SW SE SW 23-4n-7w, dry, TD 1,442 ft.

Gibson County: R. T. McDermott 1 J. H. Graper, NW NE NE 35-2s-10w, dry, TD 1,998 ft.

Posey County: Aurora Gasoline Co. 1 G. C. Smith Heirs, SW NW NE 22-4s-12w, dry, TD 2,811 ft.

EASTERN KENTUCKY

ASHLAND.—In the Furnace Gas field located along the Estill and Powell County line two operations are now in progress. In 25-P-69 Jack Kindred topped St. Peter sand at 2,643 ft. and was drilling ahead at 2,671 ft. with first gas beginning to show at that depth. In 3-O-68 and in an attempt to extend the field about 1 mile south Raydure et al have an apparent failure at 1 Chris Tipton, as both St. Peter and Knox formations proved dry. Operators, however, will plug back to the Corniferous lime and try for a producer in that horizon.

In Fleming County, 20-V-70, Walter Kline et al are drilling at 1,470 ft. on 1 James Bashford. Test has, as yet, not reached the Knox dolomite but same is expected momentarily. This is the only active deep test in the northern tier of counties of Kentucky and is being closely watched.

EASTERN KENTUCKY WILDCAT FAILURE

Johnson County: Ashland Oil & Refining Co. 8 Wallace Williams, 19-R-79, dry, TD 5,684 ft.; Big lime 312 ft., Berea sand 787 ft., Corniferous 1,430 ft., Tyrone 3,586 ft., St. Peter 4,852 ft., Knox 4,870 ft., show oil, gas and water in Knox. PB to save gas in shallow formations.

APPALACHIAN FIELD

Deep Wildcat Slated For West Virginia

PITTSBURGH.—In Portland district, Preston County, West Virginia, Hope Natural Gas Co. has made location for 9414 Chas. V. Ringer, deep wildcat test, elevation 2,194 ft. It is located on the Kingwood Quadrangle, 4 miles south of Lat. 39°, 30', and 3.65 miles west of Long. 79°, 30'. In this same district the company's 9391 John & Edna Murphy was shot in the chert with a good flow of gas but has been shut in for final test. In Steele district, Wood County, Columbian Carbon Co. 1-1139 Augusta Carson Radcliff et al was dry. Tops were: Corniferous libe 5,005-5,130 ft., Oriskany sand 5,130-94 ft. with a show of gas shot with unsuccessful results, testing only 15,000 cu. ft. Total depth was 5,219 ft. In Harts Creek district, Lincoln County, Sweetland Land & Mineral Co. 1-80 George Workman, gaged 5,257,000 cu. ft. of gas in the Big lime, total depth 1,545 ft. In Sherman district, Calhoun County, Ervin Stump 1 Harless Reed, resulted in 1,220,000 cu. ft. of gas in the Big Injun sand, total depth 2,050 ft.

In Amwell Township, Washington County, Pennsylvania, Robert Murray et al completed a good shallow sand gas well, 3 Jas. Tennant, gaging 1,200,000 cu. ft. total depth 1,058 ft. In Wharton Township, Fayette County, William E. Snee et al 3 Indian Creek Coal & Coke Co., elevation 2,615 ft., has reached 7,588 ft. Aquagel is being run in the hole. In Georges Township, Orville Eberly et al 1 N. E. Murphy, elevation 2,560 ft., has reached 7,489 ft., en-

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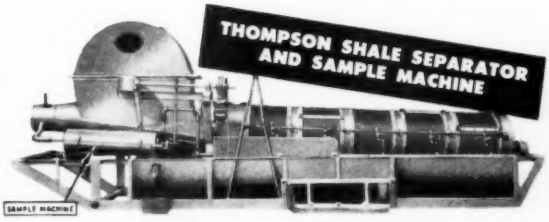

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Write for full details.

Model Q.K. produces beads up to 1½ in. on dia.; drum capacity 10-16 in. dia.; centre of tool to back 15½ in.; 20 B.W.G. material.

MOON

Regd. Trade Mark

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FOR TANK GAUGING, and the multitude of other necessary duties in and near TOXIC fumes, the Scott *Air-Pak* provides complete employee breathing protection.

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ESTABLISHED IN 1932
Scott
FOR SAFETY - FOR SERVICE

Over forty-five Oil Companies now use Scott Air-Paks in their operations.

In Canada: Safety Supply Company—offices in Toronto, Edmonton, and other Principal Cities.

SAFETY EQUIPMENT DIVISION
SCOTT AVIATION CORP.
221 ERIE ST., LANCASTER, N. Y.

countered a fishing job, and is now drilling by tools at 6,475 ft. In Napier Township, Bedford County, South Penn et al 1 Jesse B. Miller, is drilling at 6,912 ft.

Seventeen new locations were reported in West Virginia, with five in southwest Pennsylvania.

WEST VIRGINIA WILDCAT FAILURE

Wood County, Steele district: Columbian Carbon Co. 1-1139 Augusta Carson Radcliff et al, dry, elev. 846 ft., Corniferous lime 5,065-5,130 ft., Oriskany sand 5,130 ft. with show of gas, TD 5,219 ft.

CALIFORNIA

Tejon Flats Drilling Campaign Is Planned

LOS ANGELES—An exploratory-drilling campaign is to be undertaken shortly on a broad front in the Tejon Flats area of Kern County by Standard Oil Co. of California. About 7,500 acres are involved in the play, all of which Standard reportedly obtained on farmouts from Reserve Oil & Gas Co. and Richfield Oil Corp. The land lies mostly in the southern part of Township 12n-18w and the northern part of Township 11n-18w. Location for the first test well has not yet been recorded. The Tejon field is about 5 miles to the southwest and the Tejon Hills field approximately 2 miles to the southeast of the play.

Leasing activity continues brisk in the broad area extending several miles northwest of the Russell Ranch field in the Cuyama Valley due to reported shows in Superior Oil Co.'s 18-2 Government, a tight hole, in 2-11n-28w, 3 miles northwest of production, and to similarly favorable reports concerning Universal Consolidated Oil Co.'s 1 S. M.-Humble, 5 miles to the northwest of the Superior well in 24-32s-19e. The latter well is drilling below 4,700 ft. in sandy siltstone and is believed to be just above the sandy phase of the Dibblee zone, one of the producing formations in the Russell Ranch field. Site for this well was obtained on a farmout from Humble Oil & Refining Co., which has a 2,400-acre lease from the Santa Margarita Land & Cattle Co. In the event of a discovery the property would be developed jointly by the two companies.

Locations were made for three wildcats in Fresno County. The Superior Oil Co. will drill a test, as yet unnamed in 10-21s-15e, about 1½ miles northeast of Jacalitos production and 2 miles southeast of the town of Coalinga. Pacific Western Oil Corp. has staked site for 38 Burrel in 22-16s-18e, about 2 miles northwest of the Burrel oil field and ¼ mile north of Richfield Oil Corp.'s 1 Schultz, drilled to 7,801 ft. in 1942, in which minor shows were reported in both the Temblor and Eocene. Seaboard Oil Co. will drill 1 Wilson in the Jameson area, Section 17-14s-16e, 8 miles northwest of the Raisin City field and 5 miles south of the Gill Ranch field.

Two new tests for natural gas in the northern part of the state were recorded during the week. Natural Gas Corp. will drill 1 Yolo Unit in 32-10n-1e near Woodland in Yolo County. The location is about 8 miles southeast of the Dunnigan Hills gas field and 5 miles north of Fairfield Knolls gas production. Near Petaluma in Sonoma County, J. B. Brooks is preparing to drill 4 Petaluma Community Five in 30-5n-6e.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Tejon area: D. K. Associates 1 Corral, 28-11n-18w, 1½ mi. SW Tejon Hills field, TD 1,351 ft., Valvulineria Californica pay 1,316 ft., flowed 250 bbl. of 28.9 -gravity oil a day, 16 64-in. choke, TD 60 psi., CP 350 psi., elev. 877 ft.

Kings County, Harvester area: Shell Oil Co. 1-1 Harvester Unit, 11-23s-21e, 8 mi. NW Trico gas field, TD 4,300 ft., flowed

4,150,000 cu. ft. of gas a day, ½-in. choke, perf. 2,802-05 ft., TD 805 psi., CP 960 psi., elev. 199 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Comanche Point area: Leroy C. Gould, 2-1 Tejon, 33-12n-18w, dry, Santa Margarita 980 ft., basement 2,436 ft., TD 2,444 ft., elev. 815 ft.

Northeast Tejon area: D. K. Associates, 2 Buttes, 26-11n-18w, dry, Santa Margarita 110 ft., basement 920 ft., TD 985 ft., elev. 1,141 ft.

Orange County, Santa Ana Canyon area: Richfield Oil Corp. 1 Peralta Hills, 3-4s-9w, dry, TD 4,605 ft. in hard shale, elev. 400 ft.

Riverside County, Corona area: Frontier Petroleum Co. 1 Case, 34-4s-6w, dry, TD 865 ft.

Tejon Hills area: Pedro Petroleum Corp., 1-A, 13-11n-18w, dry, TD 1,715 ft., elev. 1,150 ft. O. M. Slosson, 1 Reservoir Hill, 32-11n-18w, dry, Santa Margarita 606 ft., TD 1,242 ft. in basalt, elev. 1,002 ft., Star Oil Co., 1 Tejon, 2-11n-18w, dry, TD 272 ft. in granite, elev. 1,216 ft. 2 Tejon, 2-11n-18w, dry, TD 503 ft. in granite, elev. 1,230 ft. 3 Tejon, 11-11n-18w, dry, TD 510 ft. in granite, elev. 1,365 ft. 4 Tejon, 2-11n-18w, dry, TD 235 ft. in granite, elev. 1,442 ft.

Santa Barbara County, Cuyama Valley area: Seaboard Oil Co., 1 Kirschenmann, 7-10n-26w, dry, gray Dibblee, 6,717 ft., TD 7,788 ft., elev. 2,050 ft.

Santa Rosa Island area: J. R. Pemberton, 3 Tecolate, 12-2s-32w, dry, Eocene 1,573 ft., TD 1,585 ft., elev. unknown.

Solano County, Dixon area: G. L. Speir, 1 Bliven, 26-7n-1e, dry, TD 1,515 ft., elev. 210 ft.

Ventura County, Ozema area: C. W. Colgrove 63-12 Reyes, 12-7n-24w, dry, TD 4,145 ft., brown shale 3,395 ft., basement 4,125 ft., elev. 3,537 ft.

OHIO FIELDS

Richland County Test Gets Shallow Gas Flow

COLUMBUS.—Fierbaugh and Ringles 1 A. Secrist, Section 14, Jefferson Township, Richland County, a wildcat intended for the Clinton horizon, struck a good flow of gas in the Cinnamon or shale at 770 ft. After blowing overnight and then blowing out a tubing packer, the well was tubed and gaged 1,720,000 cu. ft. of gas.

In the Bladensburg pool, Shuff & Bucy 2 A. L. Rine, Section 7, Jackson Township, Knox County, found the Clinton at 2,883-2,939 ft. with 5 bbl. of oil, natural. In the first 24-hour test after shot, the well made 45 bbl.

East of Akron, Paunee Corp. 5 Summit County, Lot 3, Tallmadge Township, Summit County, logged the Red Clinton at 4,000-60 ft. with 680,000 cu. ft. of gas natural. The well was shot, but did not respond, and the shutin gage was 680,000 cu. ft. of gas.

Ditch & Gerig completed a small well south of West Salem on 2 Earl Howman, Section 18, Congress Township, Wayne County. A natural gage of 157,000 cu. ft. of gas was shot, but it did not increase the flow.

OHIO SUCCESSFUL WILDCAT

Athens County, Troy Township: B. H. Putnam et al., 1 John P. Griffin, Fr. 3, shale 3,709-4,014 ft., 400,000 cu. ft. of gas, TD 4,170 ft.

Lummus Elects Reed As Board Chairman

Carl S. Reed, president of Lummus Co. since its formation in 1930, has been elected chairman of the board of directors. James F. Thornton, executive vice president, with the company the past 14 years, has been elected president. Lummus Co. is designing engineer and constructor of petroleum refineries and alcohol plants.

Mills, McCulloch Advanced With Foster Wheeler

Earle W. Mills was elected president of Foster Wheeler Corp. at a recent meeting of the board of directors. David McCulloch, formerly vice chairman of the board, was elected chairman of the board. Harry

E. W. MILLS

D. McCULLOCH

Sanford Brown, formerly chairman of the board and president, died suddenly on February 18, while on a voyage to South America.

Mills joined Foster Wheeler in 1949 as executive vice president and director. He was presented the David W. Taylor medal in 1948 by the Society of Naval Architects and Marine Engineers for "Notable Achievement in Marine Engineering." Mills graduated from the U. S. Naval Academy in 1917, and received his degree of master of science in naval engineering from Columbia University in 1924. He was awarded the honorary degree of doctor of engineering by University of Louisville in 1934.

McCulloch joined Power Specialty Co., a predecessor of Foster Wheeler Corp., in 1906. In 1927 when the present corporation was formed he was made secretary and assumed the duties of executive vice president in 1935, a position which he held until 1949 when he was made vice chairman of the board.

Indian Drilling Mud Opens New Warehouse at Odessa

On its fourth anniversary W. L. Potter and R. M. Ross, sole owners of

R. M. ROSS

W. L. POTTER

Indian Drilling Mud Co., Britton, Okla., have announced the opening of the company's thirtieth warehouse. The newly opened outlet for drilling-fluid products is located at Odessa, Tex.

Snap-On Tools Expand Facilities in Canada

Announcement of the expansion of distribution and production facilities of Snap-On Tools of Canada, Ltd., was made recently by A. W. Clark, general manager. Plans for a Snap-On general office and factory to cover approximately 20,000 sq. ft. are being drawn up. It is expected that construction will be completed in 1951.

A seventh Canadian branch, located at Regina, Sask., was opened January 3 to serve the demand for Snap-On service in western Canada. Other branches are located at Vancouver, Edmonton, Winnipeg, London, Toronto, and Montreal.

Continental Names Two New Store Managers

Continental Supply Co. has announced appointment of new managers for two of its store locations.

A. T. Lancaster is now manager of the store at Refugio, Tex., and H. M. Woodward has been named in the same capacity at Eunice, La.

Rector Well Equipment Co. Erecting New Office Building

Construction is well under way on this one-story office building for Rector Well Equipment Co., Inc., Fort Worth. Laurence L. Rector, president of the company, says the new building is expected to be finished about May 1. It has 4,000 sq. ft. of floor space and will house the company's general offices, drafting room, accounting department, and sales offices.

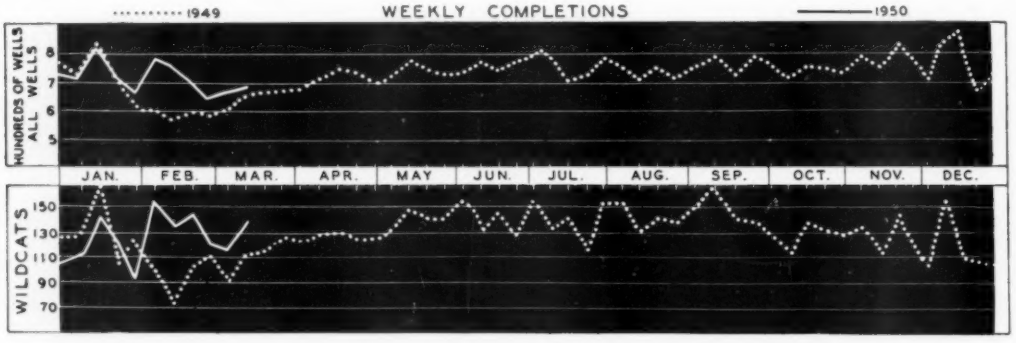
CURRENT STATISTICS

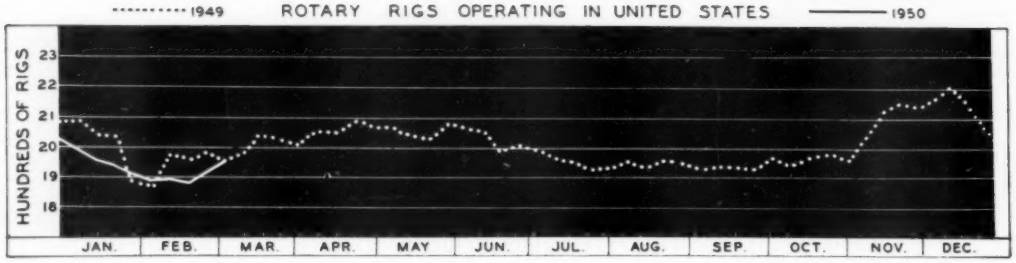
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED MARCH 11, 1950

	Total of all wells					Mar. 11		Wildcat completions and discoveries										
													Cumulative total, 1950					
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	8	4	0	*4	12,401	94	279	0	0	0	0	0	0	0	0	0	0
Pennsylvania	20	6	6	†8	30,697	226	479	0	0	0	0	0	0	0	0	0	0
West Virginia	11	2	6	3	26,339	110	97	0	0	0	1	1	0	0	2	3	5
Ohio	11	4	2	5	26,086	169	228	0	0	1	0	1	1	0	1	2	4
Indiana	24	9	1	14	41,243	189	188	0	0	0	5	5	6	0	1	20	27
Kentucky	15	6	2	7	31,118	146	144	0	0	0	1	1	3	0	0	11	14
Illinois	24	12	0	12	50,744	424	407	1	0	0	4	5	6	0	0	95	101
Michigan	11	7	0	4	26,908	128	161	0	0	0	3	3	8	0	1	56	65
Kansas	55	29	3	23	172,673	634	533	1	0	1	8	10	16	0	1	88	105
Neb., Mo., Iowa	0	0	0	0	0	14	2	0	0	0	0	0	0	0	1	8	9
Oklahoma	107	70	1	‡36	351,178	904	647	9	1	1	15	26	36	3	4	113	156
Texas	298	189	11	98	1,272,789	2,744	2,407	6	0	2	53	61	74	6	30	441	551
North Central (Dist. 7-B & 9)	89	42	0	§47	256,804	816	733	4	0	0	21	25	25	1	8	146	180
West (Dist. 7-C & 8)	95	86	0	9	539,657	806	511	1	0	0	8	9	18	1	0	101	120
Panhandle (Dist. 10)	25	18	4	3	76,893	211	213	0	0	0	0	0	1	0	2	6	9
Eastern (Dist. 5, 6, & 6-P)	24	6	2	16	88,005	198	214	0	0	0	13	13	2	1	1	53	57
Gulf Coast (Dist. 2 & 3)	28	19	4	5	160,759	373	346	0	0	2	2	4	13	1	8	52	74
Southwest (Dist. 1 & 4)	37	18	1	18	150,671	340	390	1	0	0	9	10	15	2	11	83	111
Louisiana	41	29	3	9	234,748	446	391	1	0	0	0	1	13	4	3	34	54
Northern	23	15	3	5	75,195	235	205	0	0	0	0	0	3	0	0	17	20
Southern	18	14	0	4	159,553	211	186	1	0	0	0	1	10	4	3	17	34
Arkansas	3	2	0	1	7,906	66	44	0	0	0	0	0	1	0	0	19	20
Mississippi	3	1	0	2	23,152	54	65	1	0	0	2	3	2	1	0	17	20
Southeastern States	1	0	0	1	5,514	12	8	0	0	0	1	1	0	0	1	8	9
Montana	7	5	0	2	11,381	28	33	0	0	0	2	2	0	0	0	8	8
Wyoming	6	3	1	2	24,495	117	98	0	0	0	1	1	3	0	0	18	21
Colorado-Utah	0	0	0	0	0	15	19	0	0	0	0	0	0	0	0	12	12
New Mexico	12	8	0	4	57,611	127	105	0	0	0	2	2	6	0	0	12	18
California	37	22	1	14	133,703	353	507	1	0	1	14	16	5	0	2	68	75
Tennessee	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0
Arizona	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Dakotas	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
Total United States	694	408	37	249	2,540,716	7,001	6,855	20	1	6	112	139	180	14	47	1,034	1,275
Total previous week	677	408	49	220	2,618,688			16	1	4	95	116	160	13	41	922	1,136
Total March 12, 1949	616	347	41	228	2,327,248			15	0	2	95	112	150	12	29	954	1,145

Service wells included: *4, †7, ‡2, §1





DAILY AVERAGE PRODUCTION FOR WEEK

	Mar. 11 crude oil	B. of M. Mar. demand	Mar. 4 crude oil
Alabama	1,750	1,200	1,750
Arkansas	80,100	82,000	80,900
California	864,000	834,000	866,700
Colorado	57,900	67,000	59,200
Eastern	55,650	59,900	56,600
Florida	1,125	1,000	975
Illinois	181,000	180,000	180,500
Indiana	28,400	29,000	25,900
Kansas	251,150	285,000	276,400
Kentucky	25,800	25,000	25,200
Louisiana	506,850	544,000	524,800
North Louisiana	116,050	.....	118,950
South Louisiana	390,800	.....	405,850
Michigan	45,600	45,000	45,400
Mississippi	93,750	99,000	99,900
Montana	23,500	25,000	23,900
Nebraska	1,450	700	1,550
New Mexico	129,400	130,000	130,000
Oklahoma	418,050	413,000	424,700
Texas	1,838,450	2,100,000	1,871,900
Dist. 1 (Southwest)	25,850		25,750
Dist. 2 (Southwest)	113,450		112,225
Dist. 4 (Southwest)	181,625		180,425
Dist. 3 (Gulf Coast)	310,775		333,850
Dist. 5 (Eastern)	22,775		26,725
Dist. 6 (Eastern)	76,925		78,575
East Texas field	249,200		234,450
Dist. 7-C (West)	44,475		45,525
Dist. 8 (West)	530,800		553,525
Dist. 7-B (W. Central)	62,325		62,175
Dist. 9 (N. Central)	131,000		129,525
Dist. 10 (Panhandle)	89,250		89,150
Utah	2,300	1,200	2,300
Wyoming	155,200	128,000	150,400
Total United States	*4,761,725	5,050,000	4,848,975
Change from prev. week, down	87,250		
Canada	73,135		72,190

Total U. S. production January 1-March 11 †346,390,030 bbl.
Same period last year (crude plus cond.) 380,350,455 bbl.

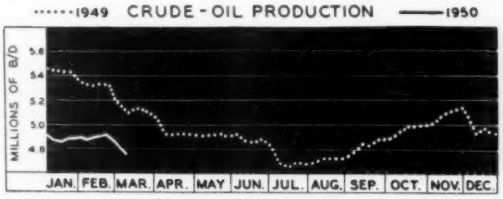
*Not including 82,390 bbl. condensate. †Including 6,369,440 bbl. condensate.

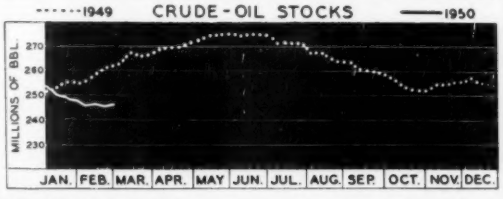
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

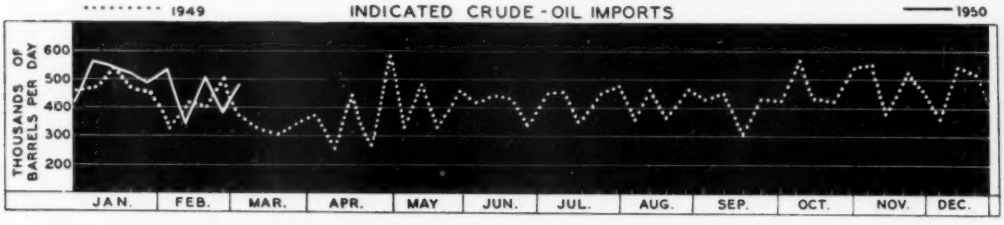
(Thousands of barrels)

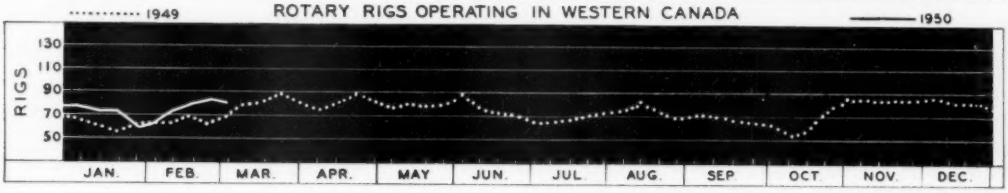
	Mar. 4, 1950	Feb. 18, 1950	Mar. 5, 1949
Pennsylvania	2,776	2,784	2,801
Other Appalachian	1,705	1,635	1,413
Illinois, Indiana, Michigan	10,838	11,198	13,444
Arkansas	3,103	3,065	3,194
Louisiana	15,691	14,795	12,809
North	3,673	3,575	3,268
Gulf	12,018	11,220	9,541
Mississippi	2,420	2,449	2,740
New Mexico	7,443	7,060	7,161
Oklahoma and Kansas	34,839	35,254	37,246
Texas	109,170	109,031	126,480
East Texas	14,849	14,962	16,603
West Texas	38,137	38,592	51,783
Texas Gulf	29,399	28,325	29,435
Other Texas	26,785	27,152	28,659
Rocky Mountain	13,604	13,514	12,658
California	37,814	37,705	33,895
Foreign	7,051	7,036	8,976
Total United States	246,454	245,586	262,817

*Bureau of Mines.







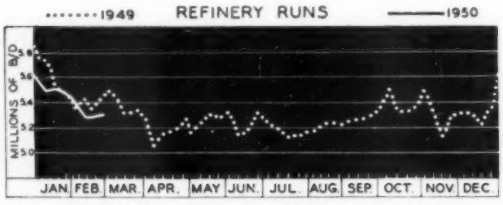


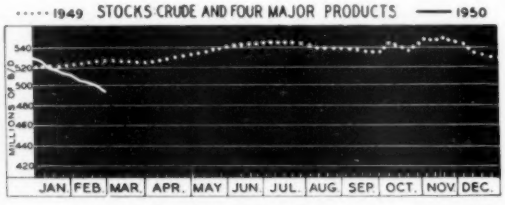
A.P.I. REFINERY REPORT, MARCH 4

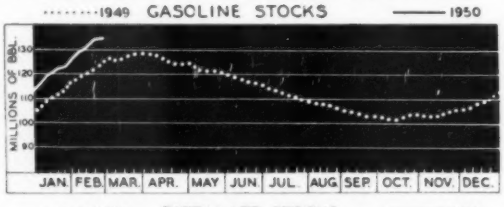
(Thousands of barrels)

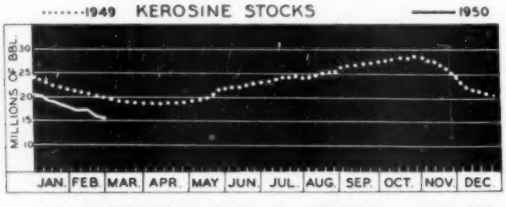
District	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, March 1949				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	790	329.7	32.7	166.0	229.7	27,517	7,020	15,806	9,085	768	305.4	27.8	164.6	210.3
Appalachian:														
District 1	86	38.4	4.6	16.1	9.7	2,744	280	490	249	83	40.9	5.0	10.1	11.6
District 2	75	33.0	6.0	11.9	16.3	1,115	96	143	105	65	32.9	3.3	6.0	15.1
Ind., Ill., Ky.	966	472.0	60.3	179.6	172.3	27,897	2,496	6,536	2,288	886	469.0	57.9	125.1	155.6
Okla., Kans., Mo.	427	241.3	20.3	80.1	62.7	14,285	551	3,066	836	422	218.1	22.6	85.7	73.2
Inland Texas	214	157.3	13.6	22.4	40.7	4,304	249	743	539	220	137.1	13.7	20.5	53.3
Texas Gulf Coast	1,205	573.3	94.1	246.9	223.3	19,843	2,036	9,713	4,941	1,291	601.9	84.1	233.6	236.3
La. Gulf Coast	436	205.7	58.7	94.4	57.6	6,966	1,418	2,722	2,202	433	195.9	47.5	91.3	57.5
N. La. and Ark.	80	25.9	7.6	12.6	14.1	3,542	292	647	260	75	27.8	7.9	11.2	16.9
Rocky Mountain:														
New Mexico	12	6.7	1	1.9	2.9	100	25	77	37	11	6.4	.4	1.5	3.0
Other Rocky Mtn.	177	82.7	7.0	32.3	36.1	5,061	223	1,449	516	165	71.3	5.4	30.5	38.8
California	848	363.6	7.0	142.7	297.4	20,834	780	10,278	25,028	933	363.0	13.9	152.6	386.3
March 4, 1950	5,316	2,529.6	312.0	1,006.9	1,162.8	134,208	15,466	51,670	46,086	5,352	2,469.7	289.5	932.7	1,257.9
February 25, 1950	5,277	2,529.0	354.9	984.3	1,122.1	133,888	16,227	56,050	48,663					
March 5, 1949	5,526	2,489.6	308.3	1,002.1	1,227.9	126,266	18,999	52,108	58,978					

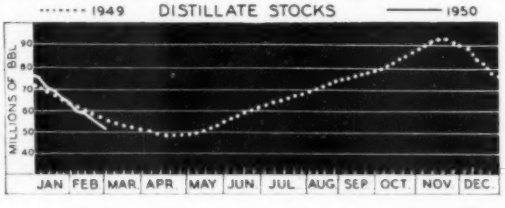
*At refineries including natural blended. †Finished and unfinished.

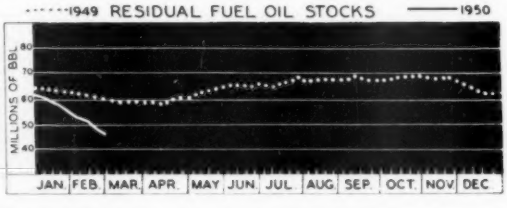


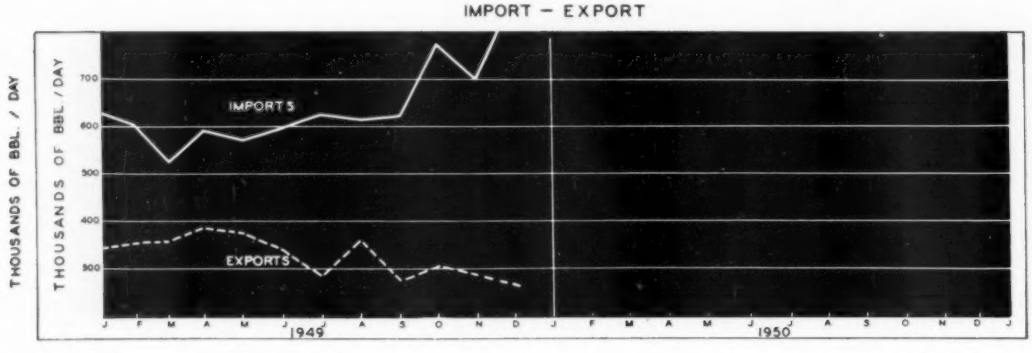












CRUDE PRICES
GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.54
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°, †35° and above

DISTILLATE fuels on the New York Harbor market continued to be rather unsteady despite recent heavy reductions in primary inventories. The generally quoted barge-lot price for No. 2 remains at 7.6 cents a gallon but additional quantities are available at 7.4 cents. The big drop in East Coast distillate stocks for the week ended March 4 seems to indicate that most of the resellers and many consumers had planned to end the season with empty tanks. The colder weather, starting near the end of February, brought a stock reduction of over 3,000,000 bbl. in 1 week, but most of current market movements are to cover immediate requirements.

Heavy-fuel prices are firm for all areas east of California. Trading at barge level in the New York area is very active. On the Gulf Coast, premiums are reported offered for low-sulfur material. However, some marketers believe that posted prices will not go back up since the high-demand season is almost over. Continuing demands in the Mid-Continent area boosted residual prices about 5 cents a barrel. Total residual stocks in the Mid-Continent and North Central areas are 55 per cent less than at this time last year. Little or no material is available on the spot market for March shipment.

Gasoline tank-car prices are firm on the Mid-Continent market but are showing some evidence of softening on the East Coast. Most of barge-lot sales in the New York area are at 10.5 cents a gallon, but more and more sales are reported at 10.375 cents. However, larger quantities are often involved in sales at the lower price. Retail price cutting is spreading in the East and in some areas of the Midwest.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of March 13, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9⅜-9¾	10.375-10.6	9-9¾
Premium gasoline, 78-80 octane	10⅜-10¾	11.5-11.6	9¾-10¾
42-44 w.w. kerosine	8½-8¾	8.8	8-8½
No. 2 straw fuel oil	7⅝-7¾	7.4-7.6	6¾-7
No. 6 residual	$1.50-1.60	$1.90	$1.50-1.60

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4	3½	3¾
Grade 18-55	4.8	4.3	4.55

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp	17
200 vis., No. 3 neutral, 0-10 pp.	11.5-12.5

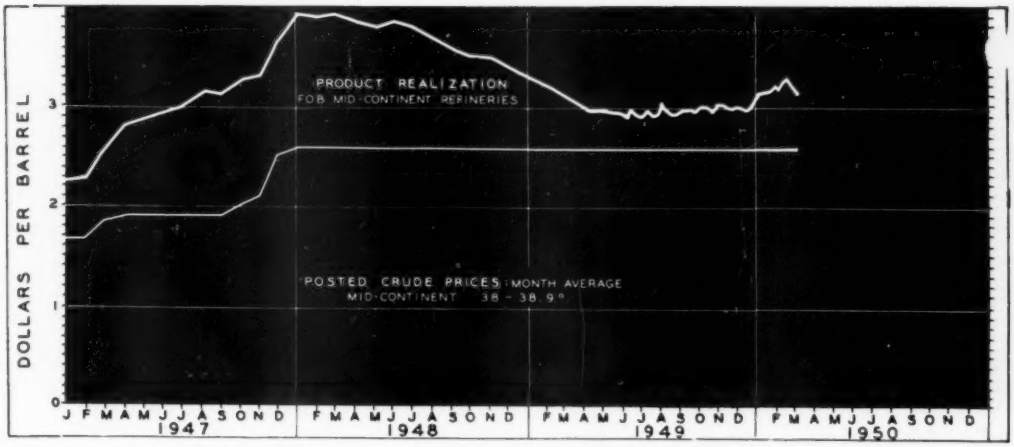
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX

Mid-Continent

132-134 A.M.P.	4.25


DOLLARS PER BARREL
3
2
1
0
PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1947
F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

EQUIPMENT MEN . . . in the News

Kelco Names Rollans-Elliott as Representative

Rollans-Elliott Co. has been appointed representative in West Texas and New Mexico for Ben F. Kelley

GENE HOLLIS

DEAN ROLLANS

Co., Inc., manufacturers of spinning-line and breakout catheads, power slips, and other KelCo safety products.

Gene Hollis, former district manager for Jarecki, will be in charge of the Odessa office and warehouse. Rollans-Elliott will maintain complete stocks of KelCo products and parts. The new distributor and Kelley both have headquarters in Tulsa.

Chiksan Appoints New Agents in Latin America

Chiksan Export Co. is extending its representation in Latin-American countries through the following appointments, as announced by G. R. Winder, vice president and sales manager:

A-Z Export Co. now covers Venezuela and Colombia, with headquarters in Maracaibo and Guanta, Anzoategui, Venezuela. Partners in A-Z Export are James E. Berry and Harry F. Simons.

Berry was associated with Shell Oil Co. at Maracaibo for 11 years and was assistant drilling superintendent for Shell in this area. Simons, formerly petroleum engineering editor for The Oil and Gas Journal, has been located in South America since 1945. Both are well known among oil men in those countries.

The Chiksan Export representative in Argentina is Sociedad Commercial Argentina, widely known as S.O.C.-A.R. Headquarters are located in Buenos Aires, under the management of W. A. Koscioulek. In Brazil, Sociedad Importadora de Equipamentos, Ltda., will specialize on the industrial market, with headquarters in Rio de Janeiro. Gabriel Filgueiras is the manager.

Chiksan Export is now represented in Cuba by Nicholas A. Schillen, with headquarters in Havana. Representation in the British West Indies is being handled by Industrial Agencies, Ltd., under the management of C. A. Fernandes, with headquarters in San Fernando, Trinidad, B.W.I.

Crawford Elected Director Of Central Scientific

W. F. Crawford, president of Edward Valves, Inc., East Chicago, Ind., has been elected a director of Central Scientific Co. of Chicago, manufacturers and distributors of scientific apparatus for industrial and educational institutions.

Crawford is also a director of Rockwell Manufacturing Co. of Pittsburgh and Washington Steel Co., Washington, Pa.

Marley Names McFadin Head of Merchandising

Robert L. McFadin has been named manager of the merchandising sales department of Marley Co., Inc., and as a result, has transferred to the main offices of the company in Kansas City, Kans. For the past year he has been in charge of merchandising sales in the New York office, and in his new position will have charge of such sales for the entire Marley organization.

McFadin attended Wisconsin University, and Michigan College of Mining and Technology, where he received his engineering degree. After graduation, he joined Carrier Corp. and on completion of its college graduate training program worked in its New York office. He then became associated with the W. T. Grant Co., as engineer in charge of air conditioning.

Jorgensen Completes Additions to Houston Plant

Earle M. Jorgensen Co.'s modern plant and office building located at Houston.

Earle M. Jorgensen Co. has recently completed an addition to its plant at Houston and during open-house festivities was host to about 1,000 guests principally from the petroleum industry.

In addition to this recent completion, Earle M. Jorgensen is constructing a new office and warehouse at Dallas. The Houston branch was opened in 1936 with 10 employes and one small warehouse and office. The company now has 70 employes and has increased its warehouses to eight. The Houston plant alone covers approximately 7 acres. It is composed of seven bays in addition to the office building and storage areas.

Home office of Earle M. Jorgensen is in Los Angeles. Principal products of the Houston plant are tubular goods, alloy and stainless bars, and hot and cold rolled and stainless sheets.

Filtrol Executives Entertain Arthur Hartigan

Executives of Filtrol Corp. honor Arthur Hartigan at a luncheon given in his honor upon announcement of his retirement from active participation in the affairs of the organization. Hartigan had been associated with Filtrol since 1924.

Harper, McCullar Named Area Sales Managers

Welex Jet Services, Inc., has announced the appointments of H. F. (Tex) Harper and Roland B. (Luke)

H. F. HARPER

R. B. McCULLAR

McCullar as area sales managers. Harper has been named sales manager for the South Texas area and McCullar for the Louisiana-Arkansas-East Texas area.

Harper, formerly with Baker Oil Tools, Inc., as district manager of the Corpus Christi area, joined Welex early this year. He is a graduate of University of Oregon. His headquarters will be in Corpus Christi. Welex South Texas field stations are at Victoria and Falfurrias.

McCullar also joined Welex the first of the year. He was formerly with Lane-Wells Co., and had been district manager in the Mid-Continent area, North Texas, and the Rocky Mountain area. McCullar's headquarters will be in Shreveport. He is a geology and engineering graduate of University of Oklahoma.

Collins Appointed to Ideco Board of Directors

The appointment of T. D. "Hi" Collins to the board of directors of International Derrick & Equipment Co. has been announced by J. B. O'Connor, chairman of the board.

Collins is a veteran of better than 20 years in the oil-field supply business. He was for many years associated with Continental Supply Co. Before becoming affiliated with Ideco, Collins was in charge of the West Texas, North Texas, and New Mexico divisions of Continental Supply. He was for a period of time also active in the Rocky Mountain area with headquarters at Casper, Wyo.

As vice president of Ideco, Collins is in charge of Ideco Supply Stores Division with stores located throughout the Mid-Continent and Gulf Coast area.

Bechtel Opens Tulsa Office

Bechtel Corp., engineering and construction organization of San Francisco, has announced the opening of offices in the Philtower Building, Tulsa. George Gibson, formerly the firm's New York representative, will be manager at Tulsa. The decision to establish permanent Mid-Continent headquarters results from the expansion of Bechtel operations in the area, mainly in the engineering and construction of refineries, chemical plants, and pipe lines.

Exploration Survey Names Lisle to Oklahoma Area

Exploration Surveys, Inc., has announced the association of George M. Lisle as its sales representative for Oklahoma. Lisle will represent Exploration Surveys in an expanded sales program which the company is planning in Oklahoma for its gravimetric and magnetic surveys and reports.

Prior to his employment with Exploration Surveys, Lisle was a sales representative for Continental Corp., which company, up until a short time ago, was exclusive agent for Exploration Surveys gravimetric surveys and reports.

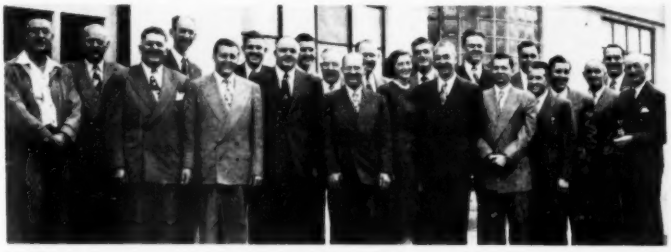
Coast Paint Acquires Technical Coatings, Inc.

Coast Paint & Chemical Co., Los Angeles, has purchased the formulas, processes, procedures, engineering blueprints, and manuals of Technical Coatings, Inc., of Pasadena. L. M. Bach, Coastal Paint president, also reported that his firm has employed all key personnel of Technical Coatings who have been working in the tank-sealing field.

In the acquisition, Walter W. Smith of Technical Coatings becomes chairman of the board, and L. C. Boller becomes vice president and chief chemist of Coast Paint, and D. M. MacGregor remains as vice president.

Along with the purchase, Coast Paint is establishing an extensive engineering, research, and development laboratory to specialize in the solution of the problems of tank

Daniel Plays Host to National Sales Staff



Daniel Orifice Fitting Co. recently held a 4-day meeting of the entire selling organization and engineering staff. Pictured above are: Jack Derr, Los Angeles; J. G. Holdenried, Los Angeles; F. N. (Newt) Davis, Tulsa; Paul S. Pirkle, Houston; S. Walter Beal, Odessa; Ralph H. Clemons, Los Angeles; Carl Davis, Davis & Davis, Denver; P. M. Vickery, Fort Worth; W. A. Stoeltzing, W. A. Stoeltzing Co., Pittsburgh; L. Waldo Wilbern, Los Angeles; A. E. Ehrke, A. E. Ehrke & Co., Cleveland; A. Ring, Los Angeles; J. Virgil Moore, Houston; Carroll O. Cox, Houston; Fred Crabbe, Malcolm W. Black & Co., Inc., New York; Joe S. Strader, Los Angeles; John Whalen, Los Angeles; George Frerichs, Los Angeles; Charles Willrich, Los Angeles; Glenn W. Daniel, Houston; W. A. Griffin, Jr., Houston; and Paul P. Daniel, Los Angeles.

design and sealing for business and industry.

De Laval Elects Stewart Executive Vice President

James P. Stewart, vice president and manager of commercial sales division, De Laval Steam Turbine Co., has been elected executive vice president and will continue as manager of the commercial sales division. W. A. Reynolds, manager of the Imo-

J. P. STEWART

W. A. REYNOLDS

De Laval Products Division, has been appointed assistant to the president.

W. A. Neumann, Jr., controller of the company has been appointed acting manager of the Imo-De Laval Products Division but will retain the title of controller. H. H. Reynolds has been named manager of the Los Angeles office and John Horth has been named manager of the St. Louis office of De Laval Steam Turbine.

Stewart joined De Laval in 1946 to handle sales of centrifugal compressors after 17 years' capital-goods experience with Elliott Co. and Borg-Warner Corp., where he held engineering, production, sales, and executive positions. He is a mechanical engineer graduate of Cornell University.

Reynolds became associated with the company in 1932 when he was made manager of the Imo Pump Division. Previously he was assistant to the vice president and general manager of Hendy Machine Co. and sales engineer for Dravo Corp. He is a graduate of Yale Sheffield Scientific School.

Neumann joined De Laval in 1946 as assistant factory controller. Prior to joining De Laval he was with Westinghouse Electric Corp. He is a mechanical engineer graduate of University of Michigan and also has a master's degree in business administration.

Kimray, Inc., Names Control Equipment as Distributor

Albert W. Reddick and Robert F. Boyd, co-owners of Kimray, Inc., Britton, Okla., manufacturer of oil and gas controls, has announced the appointment of Control Equipment, Inc., Odessa, Tex., as a distributor of their equipment.

Other representatives are located in Houston, Corpus Christi, and Graham, Tex.; Oklahoma City, New Iberia, La., and Los Angeles. Latest addition to the company's line is a floatless liquid level controller.

Coulter Joins Sales Staff Of American Iron & Machine

American Iron & Machine Works Co. has announced the addition of John B. Coulter, Jr., to its sales force in West Texas. Coulter will maintain his residence at Midland, and work through the district sales office at Odessa.

Upon graduation from George Washington University with a degree in mechanical engineering, he was connected with Rowan Drilling Co. for 3 years, and then with Hughes Tool Co. for 8 years, holding the position of district engineer upon his departure.

Elizardi to Manage Marley Houston Sales Office

James W. Elizardi has recently been made manager of the Houston sales office of Marley Co., Inc. Elizardi, who is a graduate of Tulane University, previously worked for Griscom-Russell Co. and later for the Illinois Central Railroad.

Peabody Appoints Ellis as Equipment Manager

P. W. ELLIS

Pelton W. Ellis has been named manager of the Refining Equipment Division of Peabody Engineering Corp., New York. The announcement was made by Ernest H. Peabody, president. The appointment of Ellis is one of a series of changes made by the company in recent months to bring about complet organizational flexibility in dealing with the problems of specific industries, and to afford a more complete concentration of facilities whenever and wherever they are needed.

Previous to his employment with Peabody Engineering, Ellis spent several years as sales engineer in the petroleum industry in South America.

Austin Joins Continental

Ellis Austin, formerly with Bethlehem Supply Co. on the West Coast, has joined Continental Supply Co. as sales representative specializing in production equipment. He will make his headquarters in McAllen, Tex.

(Continued on page 161)

Rockwell Division Managers Meet at Pittsburgh

A 3-day conference was held February 20-22 by Rockwell Manufacturing Co. in Pittsburgh. This meeting brought together all division managers of Rockwell. Those attending included: front row, W. S. Potter, A. J. Kerr, L. A. Dixon, Col. W. F. Rockwell, W. F. Rockwell, Jr., James E. Ashman, Pittsburgh; R. P. Melius, Power Tool Division, Milwaukee; and C. A. Wilken, Pittsburgh. Second row: William A. Marsteller, East Chicago; W. H. Newbaker, Pittsburgh; W. F. Crawford, Edward Valves, East Chicago; H. C. Stuckeman, Delta Manufacturing Division, Milwaukee; R. C. DuBrucq, Crescent Machine Division, Leetonia, Ohio; E. W. Meyers, and M. J. Carl, Pittsburgh. Third row: L. A. Dixon, Jr., Pittsburgh DuBois, DuBois, Pa.; H. F. Zorn, V & O Press Division, Hudson, N. Y.; A. R. Whittaker, National Meter Division, Brooklyn; R. G. Caouette, Pittsburgh; H. S. Rockwell, Hopewell Division, Hopewell, N. J.; W. H. Marsh, Hydraulics Division, Pittsburgh; A. Kroeger, A & H Kroeger Organization, New York; and W. R. Brown, Arcade Manufacturing Division, Freeport, Ill. Back row: E. F. Foubert, Pittsburgh; L. W. Heavner, Macnick Division, Tulsa; W. T. Kiehl, Jr., Pittsburgh; F. V. Snodgrass, Nordstrom Valve Division, Oakland, Calif.; E. W. Haas, Ohmer Corp., Dayton; A. P. Schmauch and C. S. Bygate, Pittsburgh.

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$12.00 a column inch one issue . . .
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EQUIPMENT FOR SALE

FOR SALE: 1—36-L Bucyrus Rig, 1948 model, complete with all tools. Phone 2032, Henderson, Kentucky.

FOR SALE: 1—Cardwell K Double Drum Unit unitized with GAK Waukesha. 1—7¼-x 18 Model 7P Wilson-Snyder Pump. 1—7¼ x 12 Clark Triplex Pump. 1—7¼ x 10 Model EE-PXD Gardner-Denver Pump. 1—4 x 6 Fig. 6161-A Fairbanks-Morse Pump. 1—1⅜ x 3 Union Triplex Glycol Pump. 2—D13000 Caterpillar Diesel Engines. 2—PA100 International Engines. 1—7⅝ x 8¾ Hughes Type J Core Barrel. 1—A250 Bethlehem Crown Block. 1—Deckard Monkey Board for 136'-30' Base Derrick. 1—Hunt Tool Monkey Board for 129'-24' Base Derrick. 1—13⅜ SDA Cameron Blowout Preventer c/w 13⅜ Pressure Operated Gate Valve. 1—Set (2) 7'4" wide x 10' high x 21' long Substructure c/w walkways, handrails, and steps. 1—Type B-6 Emsco Swivel. 10—5¼" OD x 30' Drill Collars in tandem of 5 each. 1—24" x 48" Link Belt Mud Screen c/w Model AEH Wisconsin Motor.
All equipment completely overhauled.
M. ROSENBLOOM PIPE & SUPPLY CO., INC.
P. O. Box 1328 Phone 4-2601
Shreveport Louisiana
Specializing in Drilling Equipment

WAR SURPLUS MACHINERY
Gaso, Byron Jackson, Aurora, Wayne Lombard, & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets of Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

7¼ x 12 GARDNER-DENVER Mud Hog Pump. Stored at Wichita Falls. D. F. MacKinnon, 3200 Main Street, Dallas, Texas. Phone C-6415.

BESSEMER TYPE 10-80 HP Direct Driven Compressor. Choice of high or low pressure cylinders. Patton and Swabe, Inc., Citizens Bank Bldg., Phone 3-3181, Tulsa.

TUBING: Hard drawn copper, finned, mfg'd by Rome-Turney, new, ⅝" OD x .049" wall, lengths 6', 7' and 8'—approximately 150,000' Total. Julius M. Fogelman, Reading, Pa.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps — two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.
H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

FOR SALE
NEW—Less than 50% replacement cost.
EXPLOSION PROOF
Motors & Controls Condulets
Rotameters 3"—$60.00 Telephones—$110.00
Power Weighing Scales Lights—$35.00
Side Entering Mixers 25HP—$200.00
Vapor Coil Heaters—$250.00
Simpson Mixers, Pumps, Valves, Meters, Filters, Gas & Oil Hose.
GENERAL TRADERS, INC.
2675 W. Grand Ave., Chicago 12, Ill.
Phone: AR 6-8050

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Two steel mud tanks, 5 feet by 8 feet; 30 feet long, made of ¼" steel, sloping bottom. Never been used. $3200. Located Makin Drilling Company's yard, Hobbs, New Mexico.

ONE Skid mounted 5 x 10 Gardner Denver Pump with 525 Buda Engine used to drill five shallow holes—$3000.00. Riverside-6811, Dallas, Texas.

FOR SALE: One Star A-83 Speedster in excellent condition. For information, call Carl A. Lesh, Hart, Michigan, or D. B. Lesh Drilling Company, St. Elmo, Illinois.

FOR SALE—Kobe triplex power unit Ser. No. 3200-001, size 2-B-2RG, direct driven, mounted on power base. Flexible engine coupling, booster pump and drive, single chemical feed, chemical tank and drive, engine beds, guards, and miscellaneous piping. ALSO, 1 Kobe triplex power unit Ser. No. 3300-111. Same as above. Both practically new and in good shape. Can be seen on lease west of Okemah, Oklahoma. For information phone 2-8095, Tulsa.

TWO CARDWELL DOUBLE-DRUM SPUDDERS: All tools, light plants, doghouses, portable masts. Also, 5,000 feet 4½" usable drill pipe. Wallace, Box 4563, Oklahoma City, Okla., Phone 62-2415.

FOR SALE: 40,000 ft. 8⅝" OD 24# Threaded & Coupled. First-class condition, equal to new. Priced Reasonable. Contact: The Tri-State Pipe Company, Phone 42, Bellaire, Ohio.

ONE new 40' x 40' x 12' corrugated aluminum building; double sliding door; single door and window; steel structure. Located: Bunkie, Louisiana. Anchor Gasoline Corp., Phone 54-3201, Tulsa, Oklahoma.

COMBINED VAPOR SEPARATOR & FRACTIONATOR FOR THERMAL REFORMING

One—New 5'-6" ID x 61'-0" over-all height Bubble Tower made of 1¼" Plate and lined throughout with 5/64" and 7/64" thick, 11-13% Chrome stainless steel, type 405. Stainless steel support plates in place for 15 Trays (Trays not included). Constructed in accordance with the API-ASME Code, stress relieved and radiographed. Designed for 400 PSI at 750° F. Fabricated by A. O. Smith Corporation. Platform and ladder clips installed.

FRACTIONATING TOWER

One—New fractionating tower, 5'-0" I.D. x89'-6" over-all height x 1⅛" plate. Thirty-four bubble trays, ten 18" 300# manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

WOOD RIVER OIL & REFINING CO., INC.
501 K.F.H. Building
Wichita, Kansas 5-5674

EQUIPMENT FOR SALE

SEISMOGRAPH EQUIPMENT FOR SALE: Two 2-Ton Chevrolet Coleman 4-Wheel Drive water trucks, 500 gallon tank completely winterized, vacuum fill, Tulsa winch, etc. Excellent condition, low mileage. Original Cost $6600.00 — Sale Price $4000.00.
One ½-Ton Chevrolet crew and field service unit. Bed enclosed with steel, cab with heater, 65 gallon gas tank with gear pump, 7.50 x 15 tires. Low mileage. Original Cost $2800.00—Sale Price $1800.00. Riverside-6811, Dallas, Texas.

FOR SALE: Used Cooper Skid Model E well servicing unit, mounted on 6X6 GMC with new motor and good rubber. With or without 8 X 10 X 60 ft. mast and tools. Unit located at Seminole, Okla., Box D-388, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE OR TRADE: 1 Failing #750 rig, break out table, separate power unit, on 4-wheel drive autocar truck, new Spring of 1949. Want Failing H.D. 1500 or similar unit. Pelco Oil Co., Elmhurst, Ill.

FOR SALE: Approximately 10,000 feet of 6" OD "Invasion" Steel Pipe, Wt. about 9#, 6⅝" OD Plain Ends, 20' lengths. New condition. Also, approximately 15,000 feet of 6⅝" OD Plain End Standard Black Steel Pipe, No. 2 Grade. Price, 65c per ft., FOB Monroe, La. M. KAPLAN & SON, Box 1883, Phone 942, Monroe, Louisiana.

FOR SALE—One used Patterson rebuilt 27" round rail 72 chamber filter press with 2½" feed end opening, good condition. American Liberty Oil Company, Box 1011, Mt. Pleasant, Texas.

FOR SALE: In West Texas, Model 61 Wichita Spudder, complete with 150 H.P., LeRoi Drilling Engine, all tools, dog house, light plant, and Shear Pole Mast. Rig is mounted on 12" I Beam Skids. Box D-228, The Oil and Gas Journal, Tulsa, Oklahoma.

CATERPILLAR D-17000 ENGINES
Two complete skid mounted units used less than 30 days. V-Belt equipped.
Alfred B. Kern
223 Wright Bldg.
Tulsa, Oklahoma

STEEL STORAGE TANKS
Railroad Tank Car Tanks, 6,500 to 12,000-Gal. Cap. Coiled and Non-Coiled.
Cleaned—Painted—Tested
Heavier—Safer—Cheaper
Other Tanks, Too.
Also — Complete Tank Cars 8,000 and 10,000-Gal. Cap.
Your Inquiries Solicited
NEWHALL-MARSHALL-WOOD, INC.
30 Church Street New York 7, N. Y.
Phone: COrtlandt 7-8090

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS. WIRE LINES. E. A. KELLY, BOX 661, OKLAHOMA CITY, PHONE 5-6407.

FOR SALE: New skid mounted Beaird-Ingersoll Rand two stage gas compressor plant, 225 horsepower. Suitable for gas lift or pressure boosting service. W. C. McBride, Inc., 1904 Milam Bldg., San Antonio, Texas.

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ON ALL ITEMS FROM

100 Octane Gasoline Refinery

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Tanks, towers and vessels.
Pumps, turbines and motors.
Heat exchangers and condensers.
Laboratory equipment.
Pipe—valves and fittings.
Boilers.
Instruments and controls.

Write, Wire, Phone for Listings

DULIEN STEEL PRODUCTS, INC.
of Washington
P. O. BOX 667
COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT WANTED

WANTED: 1,000 feet of Failing $2^3/_8$" exploration drill pipe and one $7^1/_4$ x 10 Gardner-Denver mud pump or equal. Sutter Well Works, Pass Christian, Miss.

INTERESTED in small portable double-mast rig, capable of drilling to approximately 2000 feet, with or without drill pipe. Equipment must be in good condition and reasonably priced. Preferably located in Southwest Texas. Contact:

MAKIN DRILLING COMPANY
Box 131, Hobbs, New Mexico, Phone 131

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 113 South Cincinnati, Tulsa 3, Oklahoma.

HELP WANTED

HIGH type, responsible executive wanted as Manager Latin-American operations for substantial independent producing company entering foreign operations. Applicant should be college graduate, under 40 years of age; have minimum 15 years' experience in production and drilling work, particularly in high pressure oil and gas well completions. Applicant should speak Spanish fluently, have thorough experience in development Geology, be equipped to prepare and maintain adequate reservoir and engineering studies including repressuring and pressure maintenance. Excellent compensation. When replying, give full details. Our present employes not considered for this position. Box D-364, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory (including late supplement of oil companies and drilling contractors in Western Canada). Over 500 listings in drilling, production, refinery, natural gasoline, pipelines, geological, exploration, supplies, manufacturers, services and refinery and pipeline contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 30th year)

WANTED: Instrument man with experience in oil refinery and chemical plant instruments. Denver location. State age, experience, and salary expected, in first letter. Box D-373, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN wanted to operate receding head Landis Pipe Threading Machine. Permanent job. Petroleum Pipe & Supply Co., P.O. Box 1168, Corpus Christi, Texas.

ENGINEERS, Executives, Technical Men. Salaried positions — $3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

PURCHASING Agent, thoroughly experienced. Also Right of Way procurement and Accounting and Auditing. Age 42. Prefer west coast. Box D-415, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERING Degree, 1943, Age 30, Married. Experience: Geophysical Surveyor, 3 years; Air Corps, 18 months; 5 years production and drilling. Desire Foreign employment. Now employed. Box D-412, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER: REGISTERED professional engineer with college degree. Design, sales and field experience with drilling and production oil field equipment. Desires a sales position in the Southwest. Box D-383, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Master's Degree as mining engineer—unusually varied experience—15 years with major oil company in North, Central, South America and the Far East as gravity and seismic party chief, geological interpretor and exploration supervisor; seeks position here or abroad. Box D-421, The Oil and Gas Journal, Tulsa, Oklahoma.

PUMPER capable of managing oil production. Familiar with oil and gas engines. Nearly 14 years experience. Sober. C. C. McCollum, Box 454, Madison, Kansas. Phone 381.

TREASURER - COMPTROLLER - EXECUTIVE ACCOUNTANT. Fifteen years experience accounting and taxation, CPA, Member AIA, some legal training. Desires change. Box D-419, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION WAREHOUSEMAN. Now employed by major oil company, desires change. Experienced in Control, Auditing, Inventory, Purchasing. Age 29, family. Excellent references. Box D-417, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST—30 yrs. old—2 yrs. roughnecking, 7 yrs. surface and subsurface geological work with major company in Canada, U. S., and South America, desires association with aggressive independent operator, or drilling contractor who is active in wildcatting. Prefer Rocky Mtn. area, or Canada. Pertinent details and references given on request. Box D-402, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

27,000 ACRE RANCH
Las Animas Co., Colo. Watered by wells, live springs. Improved. Handle 1200 cattle. Some oil possibilities. Not leased. $10 per acre. Speakman, 1326 E. Kiowa, Colorado Springs, Colo.

LEASE AND DRILLING BLOCKS

SEE A. L. BOWLES, ADA, OKLA., FOR DRILLING DEALS, LEASES, ROYALTIES

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky. W. P. Harley, Bowling Green, Kentucky.

80-ACRE lease in Artesia pool for sale with drilling obligation—shallow. 640 acres in Loving County, Texas—shallow, Delaware, and deeper; between Wheat Pool and Kyle Pool. Large tract in Panhandle in trend $1^1/_2$ to 3 miles from a pool of ten producing wells. John P. Mathis, P.O. Box 1106, Amarillo, Texas.

WANT an Oil Well? Proven, semi-proven and large wildcat acreages. FREE for drilling, 1/6 reserved, HOT SPOT, Loving County, Texas. E. L. Stratton, Owner, Pecos, Texas.

WE BUY PRODUCING
Oil and Gas Leases. Drilling Deals also considered. State complete details in letter to be held in strictest confidence. Box D-380, The Oil and Gas Journal, Tulsa, Oklahoma.

INTERESTED IN DRILLING BLOCKS of ten thousand or more acres in North Dakota. Box D-403, The Oil and Gas Journal, Tulsa, Oklahoma.

WEST TEXAS DRILLING BLOCKS
We have six large drilling blocks in West Texas and New Mexico to sell. Details on request. We also have many cheap minerals and royalties. Navarro Royalties Company, Odessa, Texas.

OIL LEASE FARMOUTS
N. W. Georgia, shallow Pennsylvania formations, sandstone, shale, limestone. Deming, Box 320, Waycross, Ga.

TENNESSEE—800,000 acres timber land—$3.50 per acre, all minerals included. Details: Earl Jester, 12744 Vanowen, North Hollywood, Calif.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6378 Clayton Road, St. Louis 17, Mo.

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Bought direct for you on your purchase order. Our lease block map and reprint of press and magazine articles clearly outlining this play mailed on request.

(Purchase orders accepted only from those connected with the oil industry or royalty business).

Wire, Write or Call

JOHN ALLEN or BILL McBIRNEY
Suite 200, Grand Pacific Hotel
Bismarck, North Dakota

(Member National Oil Scouts and Landmen Association. References exchanged).

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

WESTERN NEBRASKA
Oil, gas royalty in proven Cheyenne County or nearby wildcat. Write, wire, phone. Smith-Enders Land Co., Kimball, Nebraska.

PRODUCTION FOR SALE

FOR SALE: 5 Rosiclaire wells in Mattoon Field, Illinois, closely situated—good equipment—producing 13 barrels per day. Box D-418, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

FOR SALE: One complete Oil Field Machine Shop. Part cash, balance terms. Bargain if taken immediately. Box D-409, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

EXPERIENCED GEOLOGIST

Seeks capital backing for application of a new and technically sound method of mineral prospecting. For details write:

Box D-401

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

EQUIPMENT MEN

(Continued from page 158)

Kerotest Names Adams to Houston Valve Sales

E. T. ADAMS

E. T. Adams has been appointed district manager of oil-country valve sales in the Houston sales territory by Kerotest Manufacturing Co. Adams has been director of purchases and head of production control at the home offices in Pittsburgh.

Formerly with several oil firms in South America, he joined the valve-manufacturing company in 1945 as a steel valve salesman in the Houston territory. S. A. Clarke, Jr., has been named the new Kerotest purchasing agent.

Key Co. Shifts R. D. Burkhart to New York

Key Co., East St. Louis, Ill., has announced the recent transfer of Robert D. Burkhart to the staff of its eastern office at New York City.

Burkhart has been with Key Co. for 16 years, and prior to his transfer he served as assistant to the chief engineer.

Theisinger Named Regional Manager for Lukens Steel

W. G. THEISINGER

Appointment of Dr. William G. Theisinger as regional manager of sales for Lukens Steel Co., with headquarters in Houston, has been announced by J. Frederic Wiese, vice president in charge of sales.

Dr. Theisinger has been manager of technical sales, with headquarters in Coatesville, Pa., for the last 4 years. In his new position, he will supervise the activities of Lukens district sales offices and sales representatives in 12 southern states, from South Carolina to California.

Theisinger joined Lukens in 1935 as a welding and metallurgical engineer, becoming director of welding research in 1941. He was graduated from Harvard University from which he received the degree of doctor of science.

French Firm Licensed to Make, Sell Pacific Pumps

Pacific Pumps, Inc., of Huntington Park, Calif., has completed arrangements with Compagnie Generale de Construction de Locomotives Batignolles Chatillon, for the manufacture and sale of Pacific centrifugal pumps in France.

Batignolles will manufacture various types of Pacific pumps in its Nantes, France, plant, from designs and patterns furnished by Pacific. The pumps will be marketed throughout the Republic of France, the territories of Union Francoix, and the Saar territory, under the trade name Pacific-Batignolles.

The key personnel from the engineering and manufacturing divisions of Batignolles are spending several weeks at Huntington Park to study Pacific's methods of manufacture.

Roberts to Manage J-M's Houston Industrial Sales

Appointment of T. J. Roberts, of Atlanta, as Houston district manager of the Johns-Manville Industrial Products Division, has been announced by C. G. Dandrow, Johns-Manville vice president and sales manager of the Industrial Products Division.

At the same time, Dandrow announced the promotion of Henry G. Palmer to the post of Atlanta district manager, succeeding Roberts. Palmer was formerly assistant manager of the Atlanta district. A graduate of Cornell University, with a degree of civil engineering, Roberts began his career with Johns-Manville in 1925, in New York City. In his new position Roberts will supervise sales of industrial products in Texas and parts of Louisiana, Arkansas, and Oklahoma. He will make his headquarters in Houston.

Palmer is a graduate of University of Georgia and later attended Georgia Tech where he was awarded an advanced degree in civil engineering. He joined Johns-Manville in 1936 as a sales engineer in the Atlanta district. In his new post Palmer will supervise sales of industrial products in Georgia, Florida, Alabama, South Carolina, and parts of Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. His headquarters will be in J-M's Atlanta offices.

Royce Manages Tulsa Branch for Findlay Division

D. C. ROYCE

E. D. Wallace, sales manager of the Findlay Division of Gar Wood Industries, Inc., has announced the appointment of D. C. "Bert" Royce as manager of the new Buckeye factory service parts station at Tulsa. This new parts warehouse was established to provide a stock of Buckeye service parts for ditchers and shovels in the Tulsa area.

Royce was formerly with Buckeye Traction Ditcher Co., now Gar Wood Industries, Inc., Findlay Division, and has 39 years of experience in ditching equipment. R. D. "Bob" Snoddy is the new parts manager for the new factofy service parts station.

Rolette Is Named to Gulf Coast for Mud Products

Joe F. Rolette, former purchasing agent and office manager for the chemical division of Houston Oilfield Material Co., who was retired in November 1949, has reentered the mud-chemical business. Rolette has been named Gulf Coast sales manager for the chemical division of Mud Products, Inc.

Rolette's territory will be the Texas and Louisiana Gulf Coast with headquarters and warehouse stocks in Houston. He will be assisted by Ellis B. Ford, salesman. Prior to his association with Homco, Rolette was in the accounting department of Gulf Oil Corp., Tulsa. He is a former student of Oklahoma A. & M. College.

Mud Products now operates 24 branches throughout Oklahoma and Kansas. The Texas office under Rolette is the first office to be opened in the Gulf Coast area.

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CALENDAR

March

American Chemical Society, Houston meeting, Shamrock Hotel, Houston, March 26-30.

North Texas Oil and Gas Association Kemp Hotel, Wichita Falls, March 25.

Southern Gas Association, Galveston, Tex., March 27-29.

Western Petroleum Refiners Association annual meeting, Plaza Hotel, San Antonio March 27-29.

American Petroleum Institute, Division of Production, Mid-Continent district meeting Skirvin Hotel, Oklahoma City, March 29-31.

April

American Petroleum Institute, board of directors meeting, Houston, April 3-4.

National Association of Corrosion Engineers, annual conference, Jefferson Hotel St. Louis, Mo., April 4-7.

American Chemical Society, Philadelphia meeting, Philadelphia, April 9-13.

American Society of Lubrication Engineers, annual convention, Hotel Statler Detroit, April 10-12.

American Society of Mechanical Engineers, Hotel Statler, Washington, D. C. April 10-14.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman Okla., April 11-13.

National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 12-14.

American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone Hotel, Casper, Wyo., April 13-14.

American Chemical Society, Detroit meeting, Detroit, April 16-20.

Petroleum Industry Electrical Association and Petroleum Electric Supply Association joint conference, Shamrock Hotel, Houston April 18-20.

Natural Gasoline Association of America annual convention, Texas Hotel, Fort Worth, April 24-26.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting Stevens Hotel, Chicago, April 24-27.

Oil Heat Institute of America and National Oil Heat Exposition, annual meeting, Commercial Museum, Philadelphia April 24-May 1.

American Petroleum Institute, Division of Production, eastern district meeting Cleveland Hotel, Cleveland, April 26-28.

May

American Petroleum Institute, Division of Refining, midyear meeting, Hotel Cleveland, Cleveland, May 1-4.

Interstate Oil Compact Commission, spring meeting, Biloxi, Miss., May 4-6.

National Stripper Well Association, Biltmore Hotel, Los Angeles, May 7-9.

Independent Petroleum Association of America, midyear meeting, Biltmore Hotel Los Angeles, May 7-9.

American Gas Association, Natural Gas Department, spring meeting, Mayo Hotel Tulsa, May 8-9.

Liquefied Petroleum Gas Association, annual convention, Palmer House, Chicago, May 8-11.

American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, May 11-12.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 22-24.

American Institute of Chemical Engineers, regional meeting, New Ocean House Swampscott, Mass., May 28-31.

Gas Technology Short Course, Texas College of Arts and Industries, Kingsville Tex., May 29-31.

June

National Oil Scouts and Landmen's Association, Skirvin Tower Hotel, Oklahoma City, June 8-10.

American Society of Mechanical Engineers, oil and gas power division, Lord Baltimore Hotel, Baltimore, June 12-16.

Pennsylvania Grade Crude Oil Association, Hotel William Penn, Pittsburgh, Pa. June 15-16.

American Society of Mechanical Engineers, Hotel Statler, St. Louis, June 19-22.

Canadian Gas Association, annual convention, Manior Richelieu Hotel, Murray Quebec, Canada, June 20-24.

American Society for Testing Materials annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-30.

American Petroleum Institute, midyear division of production and standardization conference, Brown Palace Hotel, Denver June 26-30.

August

Interstate Oil Compact Commission, summer meeting, French Lick, Ind., August 3-5.

September

American Society of Mechanical Engineers and Instrument Society of America Municipal Auditorium, Buffalo, N. Y., September 11-15.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 13-15.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans September 25-27.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: March 6, April 3, May 10 (annual invitation dinner), all at Louis Sherry's, and June 13-15, golf party, Westchester.

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NOW and for the years ahead, our program is to serve the petroleum and natural gas industries with finest quality steel tubular goods--drill pipe, casing, tubing and line pipe that you can depend on.
QUALITY
YOUNGSTOWN
SERVICE
Youngstown
OIL COUNTRY TUBULAR GOODS

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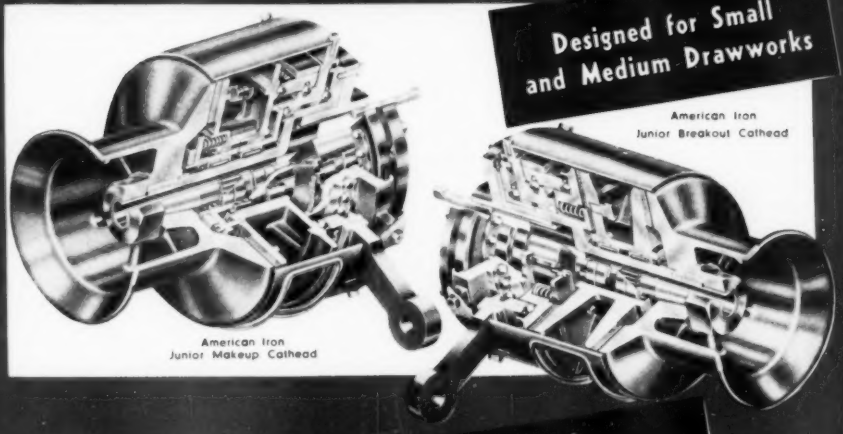

American Iron
Junior Makeup Cathead

American Iron
Junior Breakout Cathead

Designed for Small and Medium Drawworks

IT'S EASY to makeup and breakout tool joint connections with

AMERICAN IRON *Junior* FRICTION CATHEADS

Smaller in size—yet BIG in performance! That's the important news about the new American Iron Junior Friction Catheads. Their light weight and compactness make it possible for them to be safely and economically installed on any small or medium size rig.

As shown above, these catheads are designed with a simple ball-thread activating mechanism—the same as used in our larger friction catheads which have given such outstanding performance on larger drawworks. That's why our new Junior Friction Catheads produce the power that's needed to properly makeup and breakout all tool joint connections!

Check these outstanding advantages:

- **Smaller overall dimensions.**
- **More than enough power to facilitate proper makeup and breakout.**
- **Line pull closer to shaft bearing.**
- **Simple and quick installation.**
- **No adjustment necessary. Pre-adjusted at factory ready for mounting on shaft.**
- **No sensitive toggles to get out of adjustment.**
- **Non-crawling clutch drum.**
- **Instantaneous engagement and release without shock.**
- **Safety stationary guard that encloses all mechanism.**
- **Minimum number of non-wearing parts.**
- **Available with air or manual controls.**

AMERICAN IRON & MACHINE WORKS CO. · MANUFACTURERS OF OIL FIELD EQUIPMENT · OKLAHOMA CITY U.S.A.

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